

%VISUAL MACRO

USAGE GUIDE

Windows/Linux/Unix

BiX Corp.

MAY 2014



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Excel is a trademark of Microsoft Inc. WA, USA.

Examples used throughout the manual

All screen shots are taken using SAS data sets commonly found in every SAS installation under the SASHELP libname. (SASHELP.CARS, SASHELP.CLASS, SASHELP.HEART).

“DEMO” version VS “PRO” version

Upon first time installation the macro is preconfigured as “DEMO” version that can display data sets up to 1000 observations. You can ask for a “trial activation key” the removes the limitation for a 30 days trial period. Upon purchasing the “PRO” version you will receive an activation key that permanently removes the limitation.

To purchase the “PRO” version please go to: http://bixforsas.com/?page_id=5442

Prerequisites - Important

%visual macro can be installed on the following platforms:

Windows laptop or desktop

Windows server

Linux server

Unix server (SOLARIS, HPUX, AIX)

Monitor Resolution

High resolution monitor (A minimum of 1024X768 is required. Higher resolution is mostly recommended and will allow more windows to be shown simultaneously).

SAS Software

SAS 9.2 and above.

Minimum required SAS products: SAS/BASE, SAS/GRAPH.

Java Machine

Must be installed for producing KPI charts.

SAS Fonts

Windows: Must use DMS font: SASFONT Medium 8.

X11 Based systems – please consult the installation guide for setting the correct fonts.

X11 Server (for Unix/Linux systems).

Any X11 server package (Examples: Exceed, Exceed-on-Demand, MOBAXTERM)

Consult BiX technical support for any question regarding setting of %visual to work under your X11 environment.

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Activating the Macro

Overview

Method 1 – Calling the macro from a SAS program

Method 2 – Assigning the macro to a function key

Method 3 – Assign the macro as a default action in the SAS Explorer

Method 4 – Calling the macro from a SAS/AF application

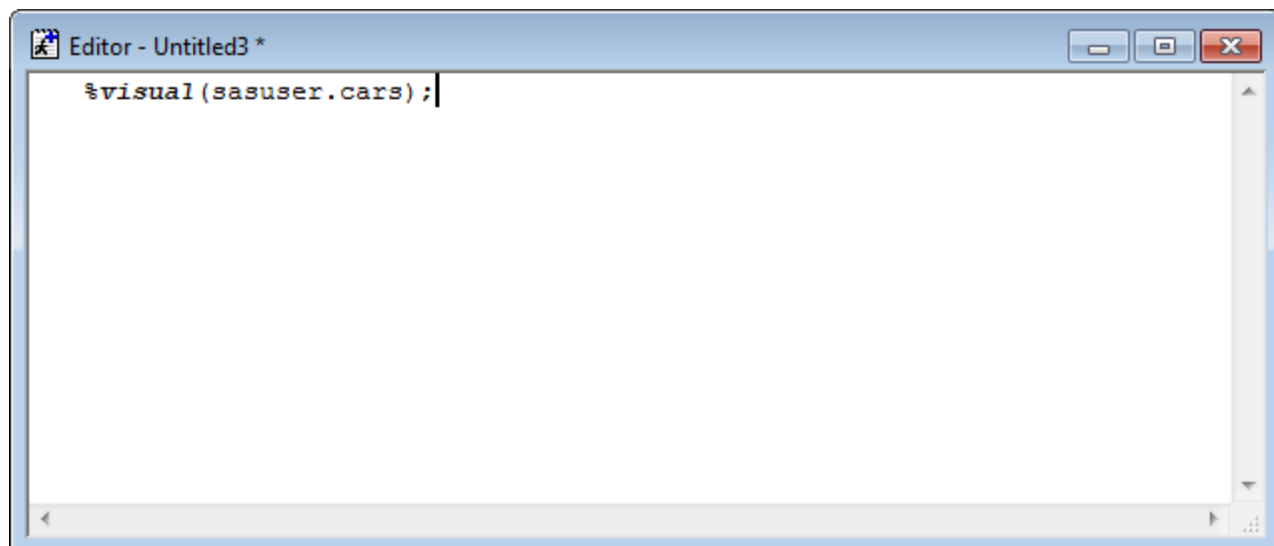
Overview

After installing the macro as described in the installation guide and setting the site parameters you can use the macro in several methods in your SAS session.

Method 1 – calling the macro from a SAS program

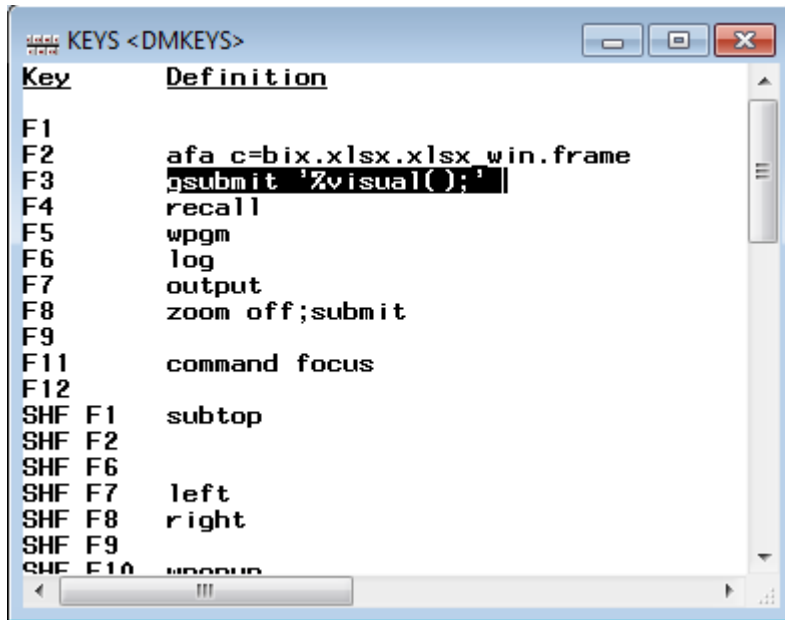
The first method is to insert a call to the macro into your SAS code. This can be done anywhere in the code.

When submitted in interactive environment, the call to the macro will launch the interactive interface displaying the data set specified as a parameter to the macro.



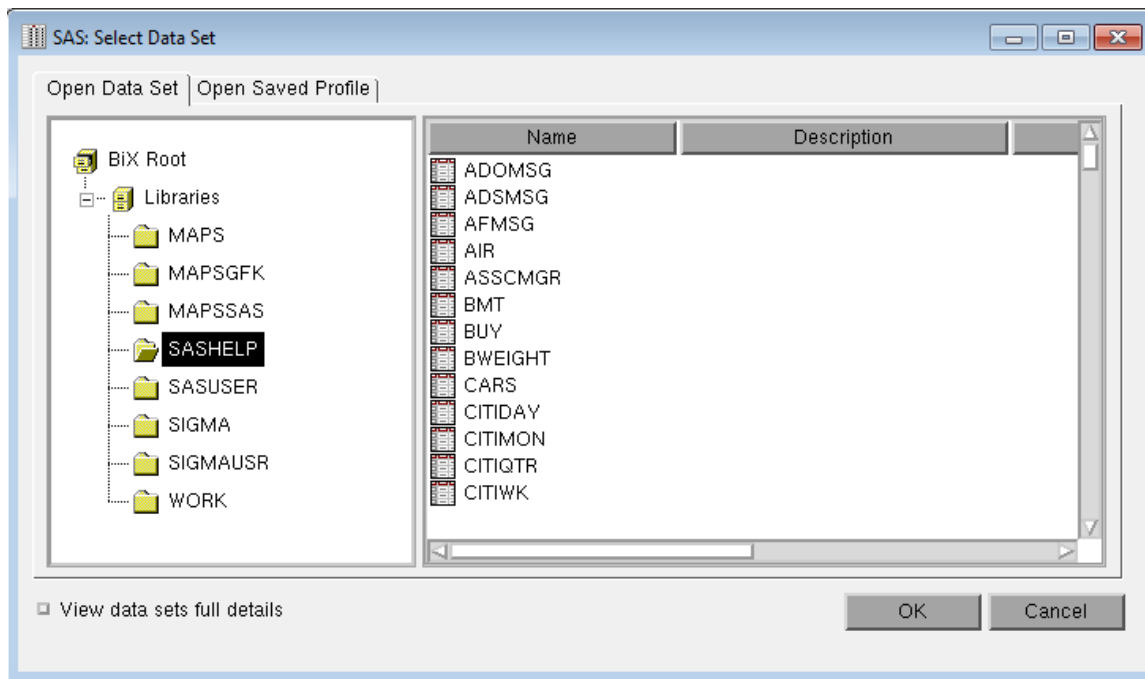
Method 2 – Assigning the macro to a function key

You can assign the macro to a function key as displayed in the following figure:

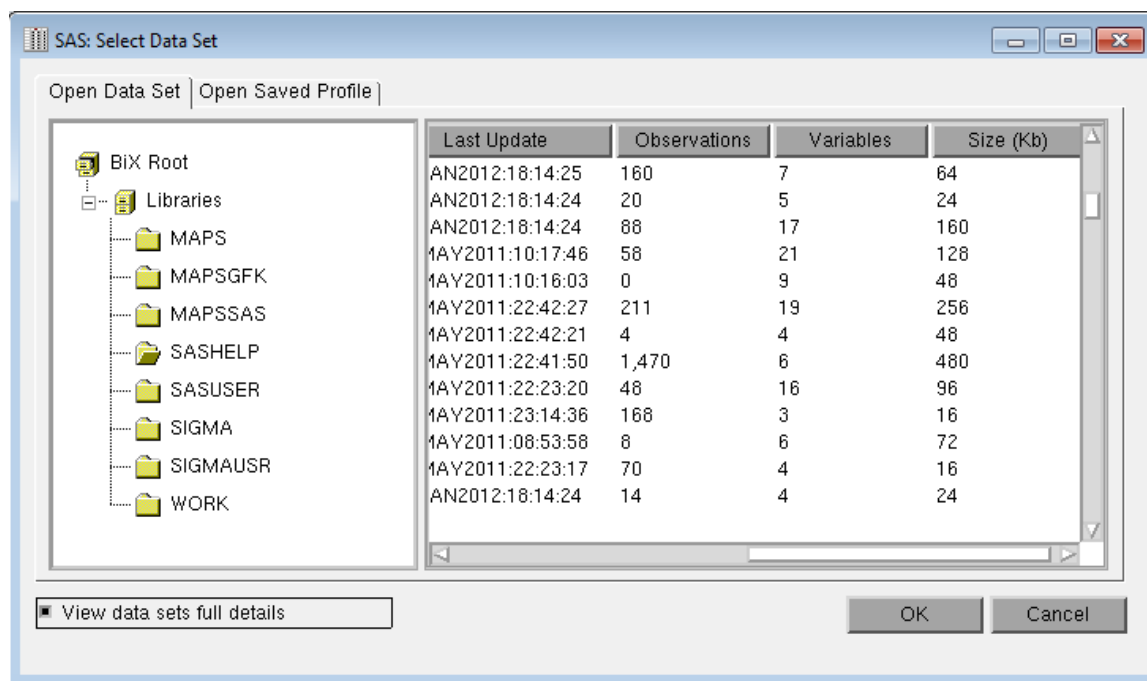


The syntax for the command is: **gsubmit "%visual()";**

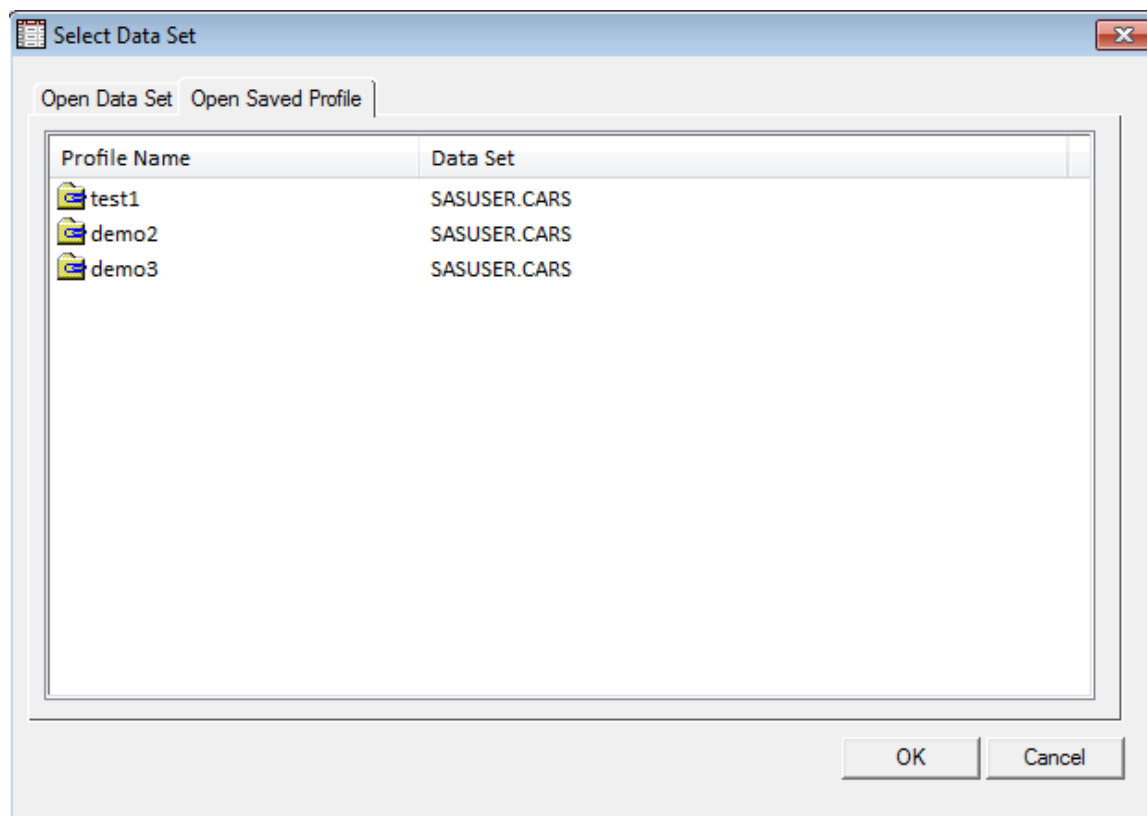
Each macro invocation done without a data set parameter will first activate a preliminary window where you'll be asked to select a data set or a profile:



If you want to view more details about the data sets, check the option and scroll the slide bar to the right to view description (label), last update and number of observations, variables and file size:



You can also select a predefined profile from your saved list of profiles shown on the second tab:



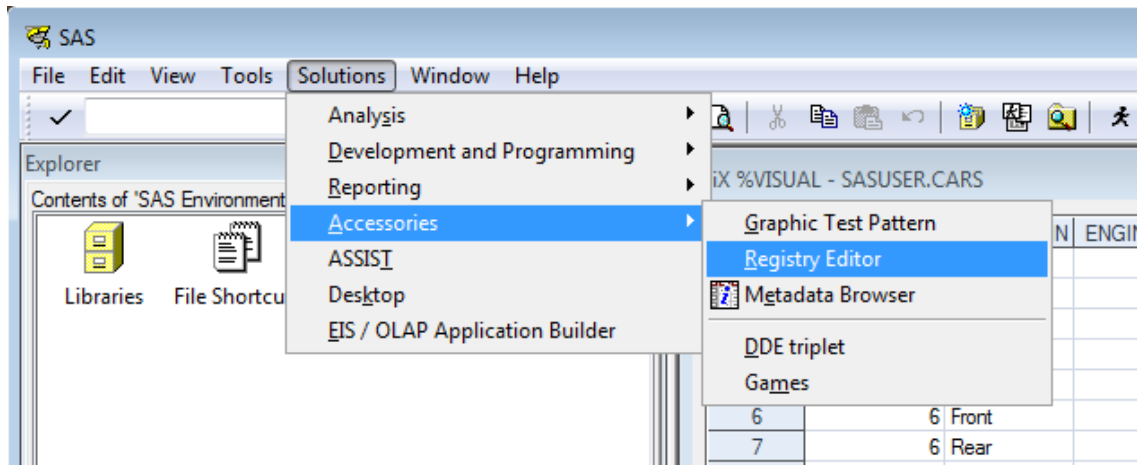
The profiles consist of a data set name and a list of saved attributes used as a starting point of the data set. For example, if you always want to view your data with your choice of variables, where clauses and conditional Formatting, then you can save these settings while in %visual viewer window into a named profile and use it here to open the data set with these settings implied automatically.

Method 3 – Assign the macro as your default action in the SAS Explorer

Using the third method will replace the standard built-in viewtable() SAS command which is invoked by default whenever you double click on a SAS data set inside the SAS Explorer window.

To change the default behavior of SAS Explorer window you need to change some setting in the SAS registry as described in the following sections:

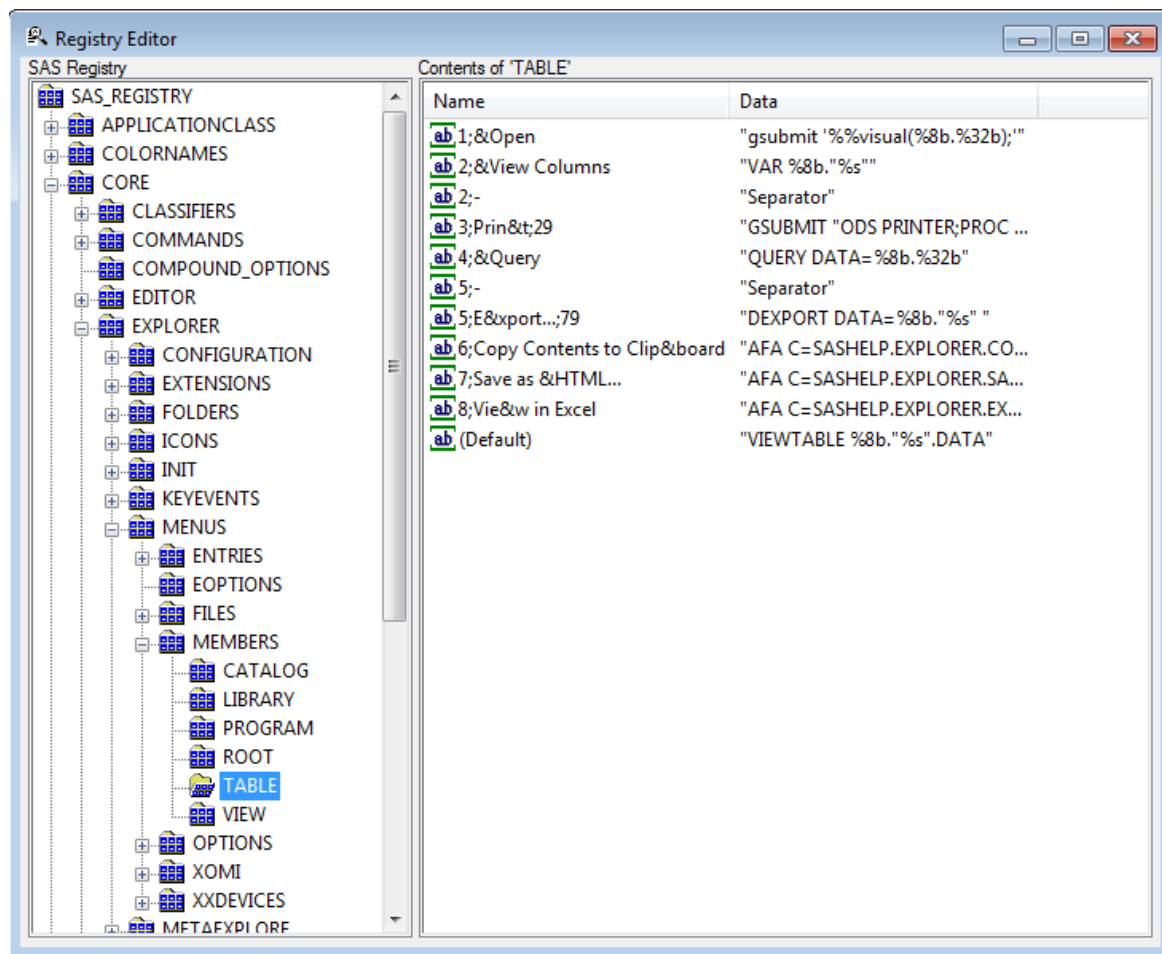
3.1 Invoke the Registry Editor



3.2 Select the “TABLE” node

Expand the SAS_REGISTRY tree as described in the following path:

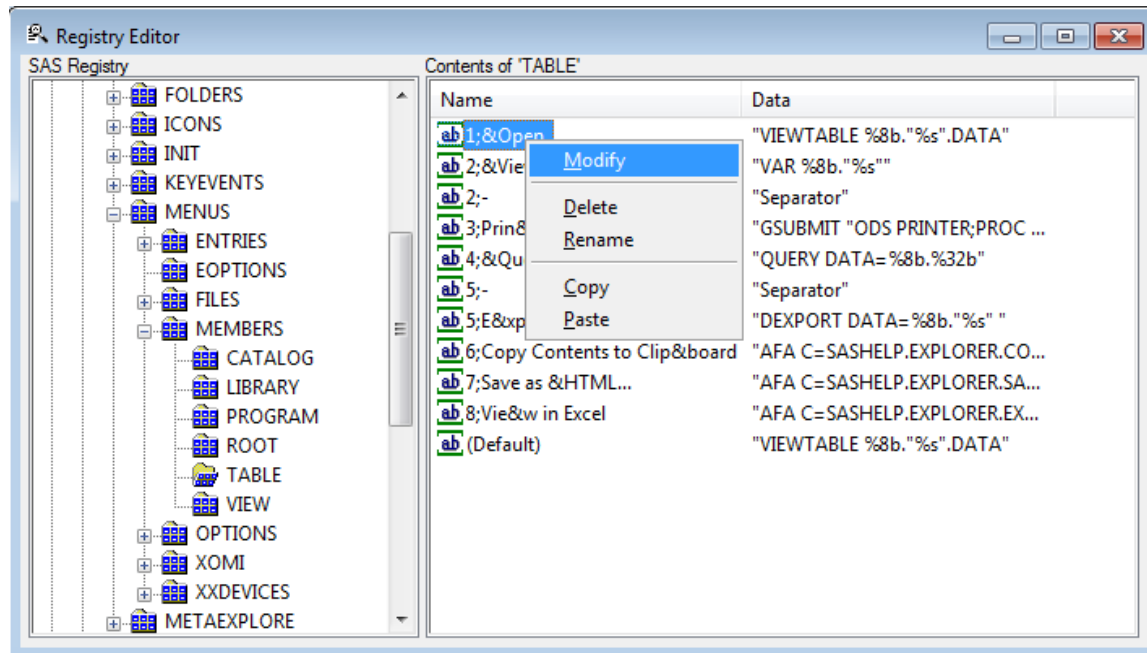
SAS_REGISTRY → CORE → EXPLORER → MENUS → MEMBERS → TABLE



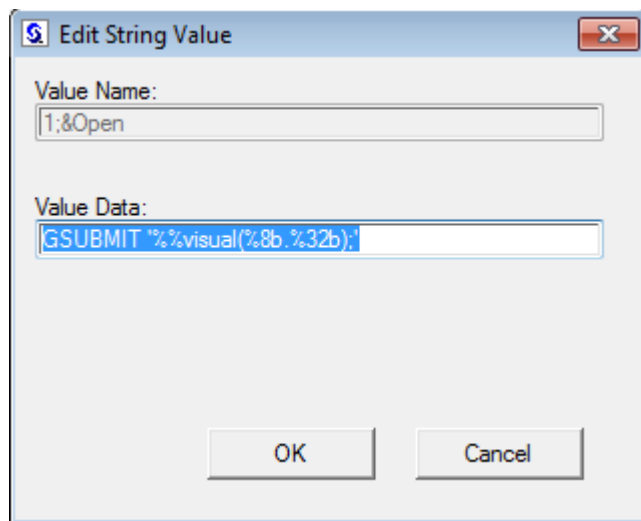
In the right side of the window you can control the default behavior of each option in the pop-menu. We recommend to change the first option (Open...) which will leave the default behavior (double click) to the standard SAS viewtable() command. If your SAS environment contains also SAS views then you must repeat the operations for the "VIEW" node as well.

3.3 Modifying the registry key

Select the first key and open the pop-menu. Select the “Modify” option as displayed in the following figure:



Set the value of the key to the following command: **GSUBMIT '%%visual(%8b.%32b);'**



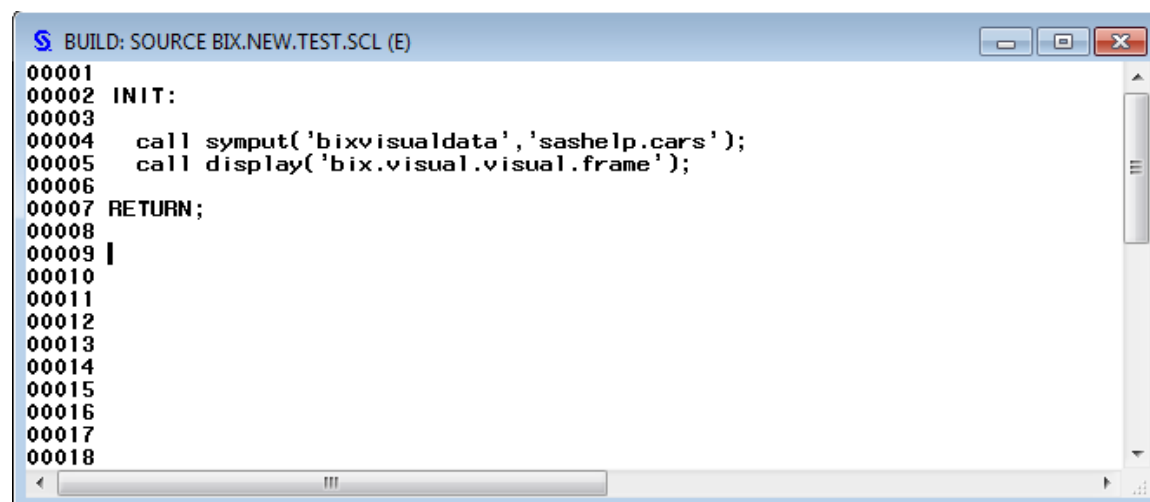
This setting will override the default behavior and each time you will select a data set using the “open...” option from the pop menu of the SAS explorer window it will launch the “%Visual Viewer” window instead.

Note: You can also set the value of the last key (Default) which controls the double-click operation on a data set.

Note for sites with Server installation: The above procedure can be done in the “root” part of the registry thus changing the default behavior for all SAS users simultaneously.

Method 4 – Calling the macro from a SAS/AF application

If you need to integrate the %Visual Viewer into a SAS/AF application then you can call the %Visual Viewer window from within a SCL program in the following method:



```
00001
00002 INIT:
00003
00004   call symput('bixvisualdata', 'sasheIp.cars');
00005   call display('bix.visual.visual.frame');
00006
00007 RETURN;
00008
00009 |
00010
00011
00012
00013
00014
00015
00016
00017
00018
```

Basic Concepts

Overview

Selecting (Highlighting) Data Methods

Selecting specific variables (columns)

Selecting specific observations (rows)

Selecting a block of data

Selecting the entire table

Using the Pop menu

Overview

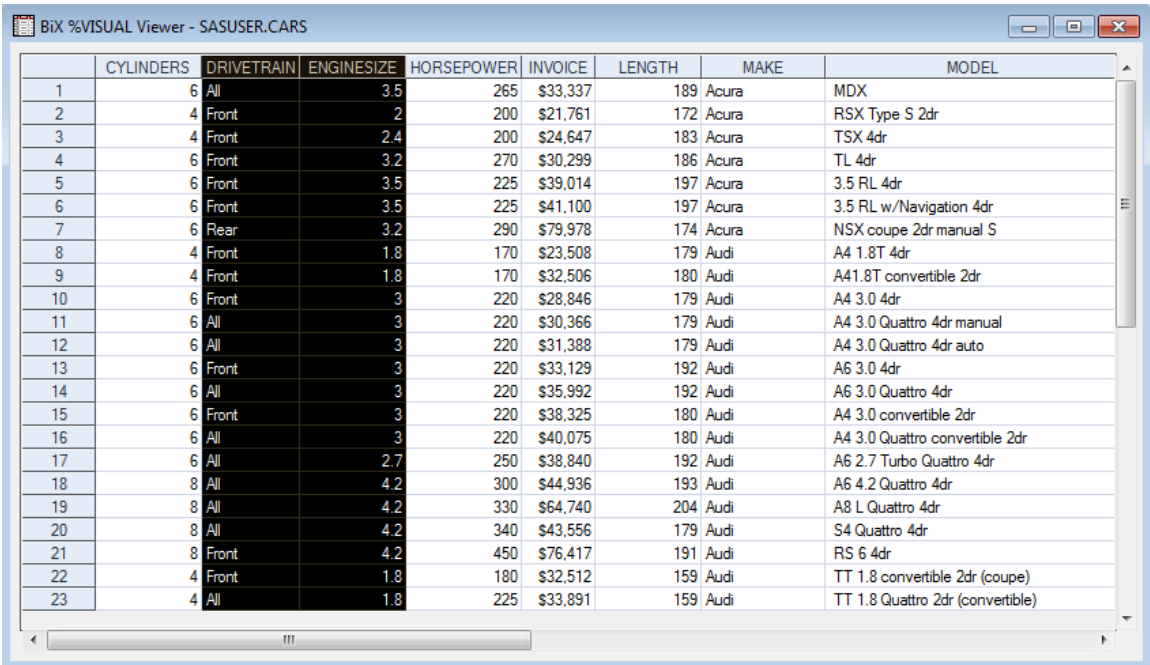
All operations done in %Visual Viewer window are initiated by highlighting a block of data needed for the operation to follow. For example, in order to create a chart, first highlight the data block needed for the chart and then by using the pop menu select the "*Ad Hoc Charts...*" option which will open the "%Visual Chart Editor" wizard that will guide you through the rest of the steps to complete the definition of the chart.

Selecting (Highlighting) Data Methods

You can select data in %Visual Viewer window in many ways. Data must be adjacent in a contiguous block. Select by clicking the left mouse button on the selected column or area. This action will highlight your selected area in a black background color as described in the following figures:

Selecting specific variables (columns)

This column selection is done by left button clicking and dragging the mouse over the column's headings.

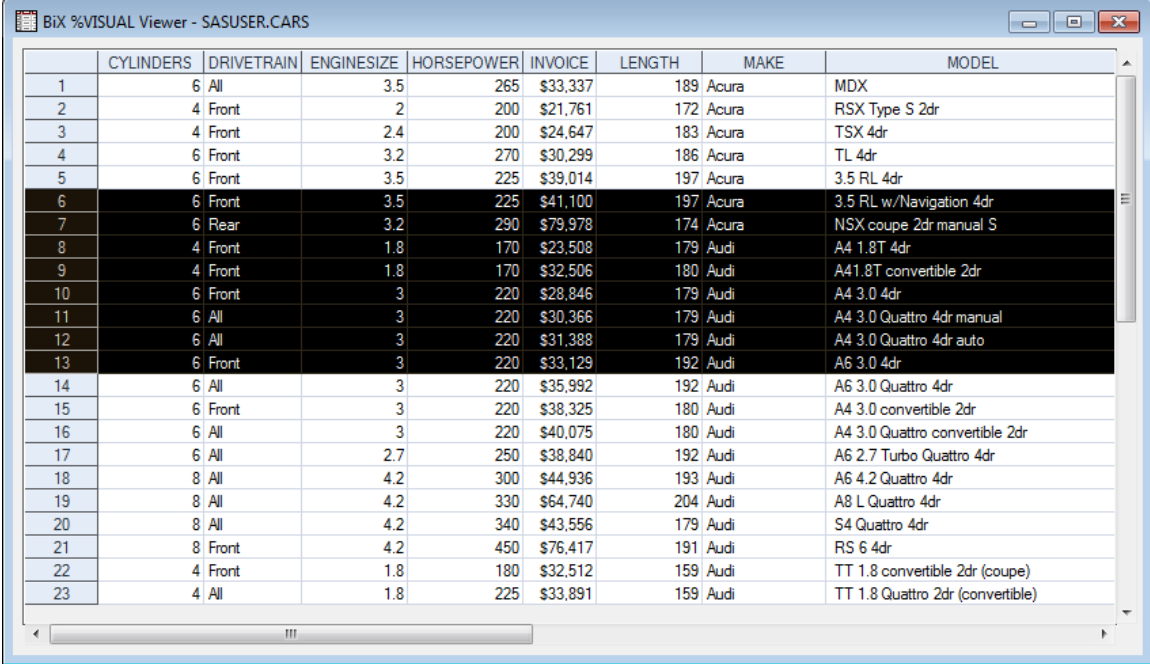


	CYLINDERS	DRIVETRAIN	ENGINE SIZE	HORSEPOWER	INVOICE	LENGTH	MAKE	MODEL
1	6	All	3.5	265	\$33,337	189	Acura	MDX
2	4	Front	2	200	\$21,761	172	Acura	RSX Type S 2dr
3	4	Front	2.4	200	\$24,647	183	Acura	TSX 4dr
4	6	Front	3.2	270	\$30,299	186	Acura	TL 4dr
5	6	Front	3.5	225	\$39,014	197	Acura	3.5 RL 4dr
6	6	Front	3.5	225	\$41,100	197	Acura	3.5 RL w/Navigation 4dr
7	6	Rear	3.2	290	\$79,978	174	Acura	NSX coupe 2dr manual S
8	4	Front	1.8	170	\$23,508	179	Audi	A4 1.8T 4dr
9	4	Front	1.8	170	\$32,506	180	Audi	A4 1.8T convertible 2dr
10	6	Front	3	220	\$28,846	179	Audi	A4 3.0 4dr
11	6	All	3	220	\$30,366	179	Audi	A4 3.0 Quattro 4dr manual
12	6	All	3	220	\$31,388	179	Audi	A4 3.0 Quattro 4dr auto
13	6	Front	3	220	\$33,129	192	Audi	A6 3.0 4dr
14	6	All	3	220	\$35,992	192	Audi	A6 3.0 Quattro 4dr
15	6	Front	3	220	\$38,325	180	Audi	A4 3.0 convertible 2dr
16	6	All	3	220	\$40,075	180	Audi	A4 3.0 Quattro convertible 2dr
17	6	All	2.7	250	\$38,840	192	Audi	A6 2.7 Turbo Quattro 4dr
18	8	All	4.2	300	\$44,936	193	Audi	A6 4.2 Quattro 4dr
19	8	All	4.2	330	\$64,740	204	Audi	A8 L Quattro 4dr
20	8	All	4.2	340	\$43,556	179	Audi	S4 Quattro 4dr
21	8	Front	4.2	450	\$76,417	191	Audi	RS 6 4dr
22	4	Front	1.8	180	\$32,512	159	Audi	TT 1.8 convertible 2dr (coupe)
23	4	All	1.8	225	\$33,891	159	Audi	TT 1.8 Quattro 2dr (convertible)

Tip: If the variables needed for your selection are not adjacent, you can use the "*Select Variable...*" windows or the "*Move Column*" option to organize them in a specific adjacent block.

Selecting specific observations (rows)

This rows selection is done by left clicking on the rows numbers (The most left column) and dragging the mouse over the rows numbers.



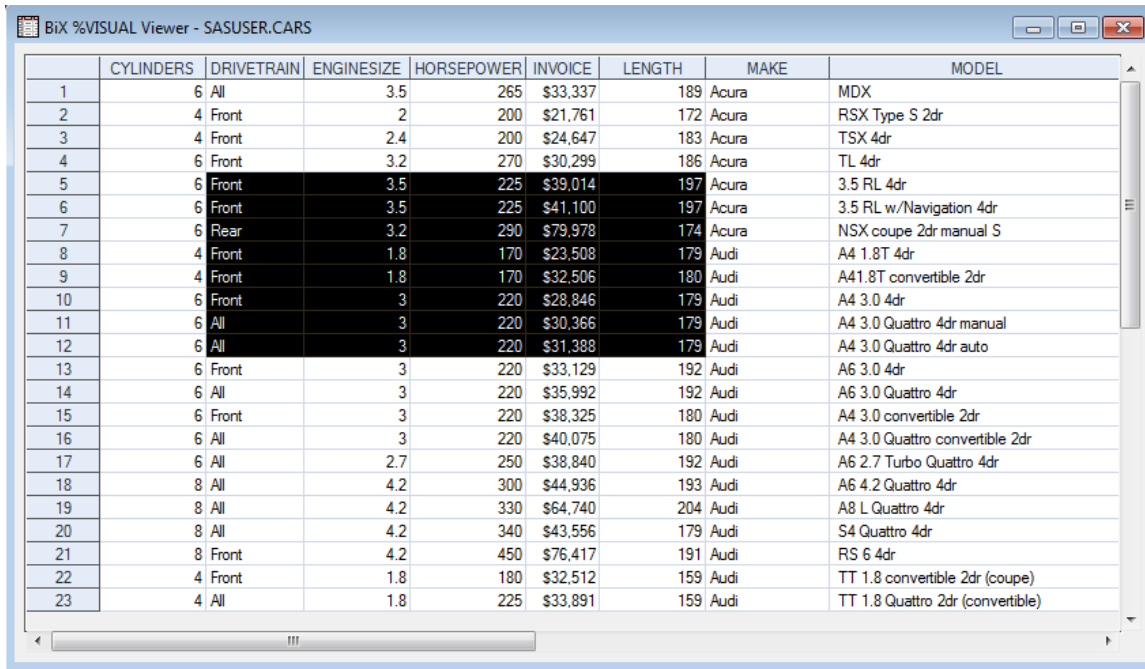
BiX %VISUAL Viewer - SASUSER.CARS

	CYLINDERS	DRIVETRAIN	ENGINE SIZE	HORSEPOWER	INVOICE	LENGTH	MAKE	MODEL
1	6	All	3.5	265	\$33,337	189	Acura	MDX
2	4	Front	2	200	\$21,761	172	Acura	RSX Type S 2dr
3	4	Front	2.4	200	\$24,647	183	Acura	TSX 4dr
4	6	Front	3.2	270	\$30,299	186	Acura	TL 4dr
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23	4	All	1.8	225	\$33,891	159	Audi	TT 1.8 Quattro 2dr (convertible)

Tip: If you need specific observations to be selected, use the "Simple filter" or the "Advanced Filter" option from the pop menu which allow you to view only the observations that meets your needs.

Selecting a block of data

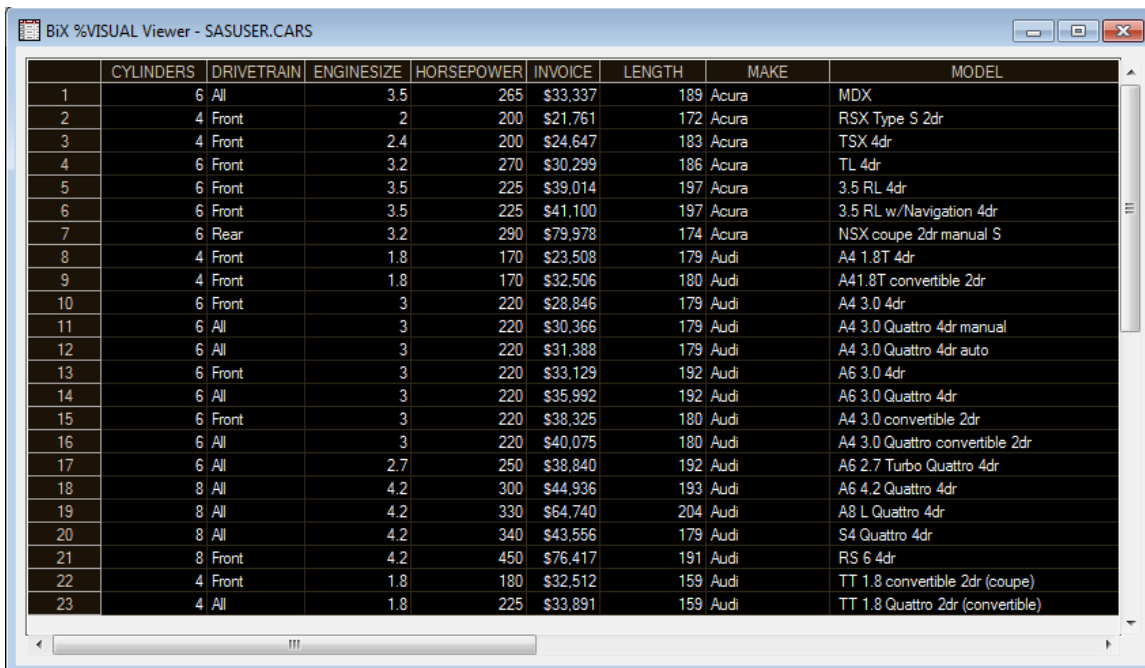
This block selection is done by pointing the mouse on the top left cell and dragging the mouse over the desired block down to the right bottom cell.



	CYLINDERS	DRIVETRAIN	ENGINE SIZE	HORSEPOWER	INVOICE	LENGTH	MAKE	MODEL
1	6	All	3.5	265	\$33,337	189	Acura	MDX
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3	4	Front	2.4	200	\$24,647	183	Acura	TSX 4dr
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5	6	Front	3.5	225	\$39,014	197	Acura	3.5 RL 4dr
6	6	Front	3.5	225	\$41,100	197	Acura	3.5 RL w/Navigation 4dr
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20	8	All	4.2	340	\$43,556	179	Audi	S4 Quattro 4dr
21	8	Front	4.2	450	\$76,417	191	Audi	RS 6 4dr
22	4	Front	1.8	180	\$32,512	159	Audi	TT 1.8 convertible 2dr (coupe)
23	4	All	1.8	225	\$33,891	159	Audi	TT 1.8 Quattro 2dr (convertible)

Selecting the entire table

This selection is done by pointing and left-click on the top left cell and then dragging the mouse into the table area while the left mouse button is still pressed.



	CYLINDERS	DRIVETRAIN	ENGINE SIZE	HORSEPOWER	INVOICE	LENGTH	MAKE	MODEL
1	6	All	3.5	265	\$33,337	189	Acura	MDX
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23	4	All	1.8	225	\$33,891	159	Audi	TT 1.8 Quattro 2dr (convertible)

Using the Pop menu

Before (or after) highlighting a block of data you can always invoke the pop menu by right-clicking the mouse. Options available in the pop menu varies according to selected area in the table and by the type of selected variable (Numeric or Char). For example, the "*Univariate Drill-Down...*" option is only available for numeric variables and for a selected block of entire single variable (one full column).

	Option	Description	Remarks
 Frequency Drill-Down...  Univariate Drill-Down...  Decomposition Tree... Clear All Drill-Downs  Statistical Info...  Ad-hoc Report...  Ad-hoc Chart...  Simple Filter...  Advanced Filter... Clear All Filters  Select Variables...  Conditional Formatting... Clear All Conditions  Sort... Clear All Sorting  Go to First Observation  Go to Last Observation  Move Column  Paste Column After  Copy to Clipboard  Save as SAS Dataset...  Column Properties...  Viewer Properties...  Save as Profile...	Frequency Drill Down	Shows a frequency analysis of values within the selected column in a graphical dynamic interface which lets you continue with data exploration by selecting slice(s) or row(s) for further drill downs.	Only available for a single complete column highlighting. Mostly suitable for nominal discrete values (Character or Numeric type).
	Univariate Drill Down	Shows a univariate analysis of values within the selected column in a graphical dynamic interface which lets you continue with data exploration by selecting bars(s) or row(s) for further drill downs.	Only available for a single complete column highlighting. Mostly suitable for continuous values (Numeric type only).
	Decomposition Tree	Shows in graphical diagram the complete drill path to the current state of displayed data.	
	Clear All Drill Downs	Clear all drill downs and exit all drill down windows back.	
	Statistical Info	Shows statistics for any type of rectangle selected. Similar (but more robust) to Excel "Sum" & "Count" values shown at the bottom when selecting cells in a spreadsheet. Results may vary according to the type of variables selected inside the rectangle.	A quick way of getting statistical info without writing any piece of SAS Code.

	Ad hoc Report	Sends the data inside the selected rectangle to %Visual reporting utility. The report can be exported into many different file formats: Html, Excel2010 (xlsx), rtf, and pdf.	Automatic generation mechanism can be implied when producing reports.
	Ad hoc Chart	Sends the selected rectangle to “%Visual Chart Editor” which can create various charts based on the selected variables and values inside the rectangle. Charts can be sent to %Visual reporting utility where they can be integrated into many different types of documents.	Many business charts like: Bar, Pie, Map, Plot, Barline and KPI can be created with no knowledge of SAS syntax.
	Simple Filter	A very quick and straight forward method to filter your data. Similar to Excel popular “Column Filter” method.	Only available for a single complete column highlighting.
	Advanced Filter	Fully featured utility to filter the data based on simple to complex logic “Where” clauses. Intuitive GUI guides you in the process and lets you also integrate user written “Where” clauses into the filter. Macro variables can be also integrated into the filter.	Tip: Try the “Advanced Date Filter” on a date type variable...
	Clear All Filters	Removes all filters (Simple and Advanced) implied on the data.	Filtered data is shown in a specific background color which can be selected through “Viewer Properties” window.

	Select Variables	If your data contains many variables, you can select those of interest and arrange them in your desired order of display.	You can also “Freeze” variables while scrolling left and right in the viewer.
	Conditional Formatting	Highlights the data using color schema based on dynamic statistical analysis. When reporting to Excel, uses Excel symbols for conditional formatting. Can be used as an executive dashboard. Different conditional formatting can be implied simultaneously on different variables.	Only available for a single complete column highlighting.
	Clear All Conditions	Removes all Conditional Formatting colors from all variables.	
	Sort	Sorts the data according to the selected column(s). “Nodupkey” method can remove duplicate observations while sorting.	The underlying data is not affected and you can sort data even without “write” permission on the data.
	Clear All Sorting	Remove All sorting condition from all variables.	
	Go to First Observation	Quick method to display the first observation of data.	
	Go to Last Observation	Quick method to display the last observation of data without the need to scroll down repeatedly.	May take longer on first time.
	Move Column	Enables to rearrange columns in a specific order. You may alternatively use the “Select Variables...” option.	Mostly used when variables needed for chart, sort or reports are not adjacent.

	Paste Column After	Completes the “Move column” operation.	
	Copy to Clipboard	Copies the data inside the selected rectangle into the Computer’s clipboard. You can then quickly paste the data using standard “Ctrl-V” into many popular Windows applications.	Variables names always form the first line in the clipboard.
	Save as SAS Data set	Save the data inside the selected rectangle as a new SAS data set in your selected library and data set name.	
	Column Properties	Shows SAS and %Visual Meta-Data about the column. Also allows to temporarily replacing the attached SAS format.	Changing the format is useful when drilling down, for example, on a date variable when you want to view distribution of values by year and not by day.
	Viewer Properties	Opens a window where you can set general properties of the viewer like colors, order of variable and more.	
	Save as Profile	Saves all settings selected in %Visual Viewer window session for future use with the same data set.	The Profile can be used to restart at the same position (where clauses, selected variables, Conditional formatting etc.)

A detailed explanation of each option shown at the above pop menu follows in the next coming pages.

Frequency Drill-Down

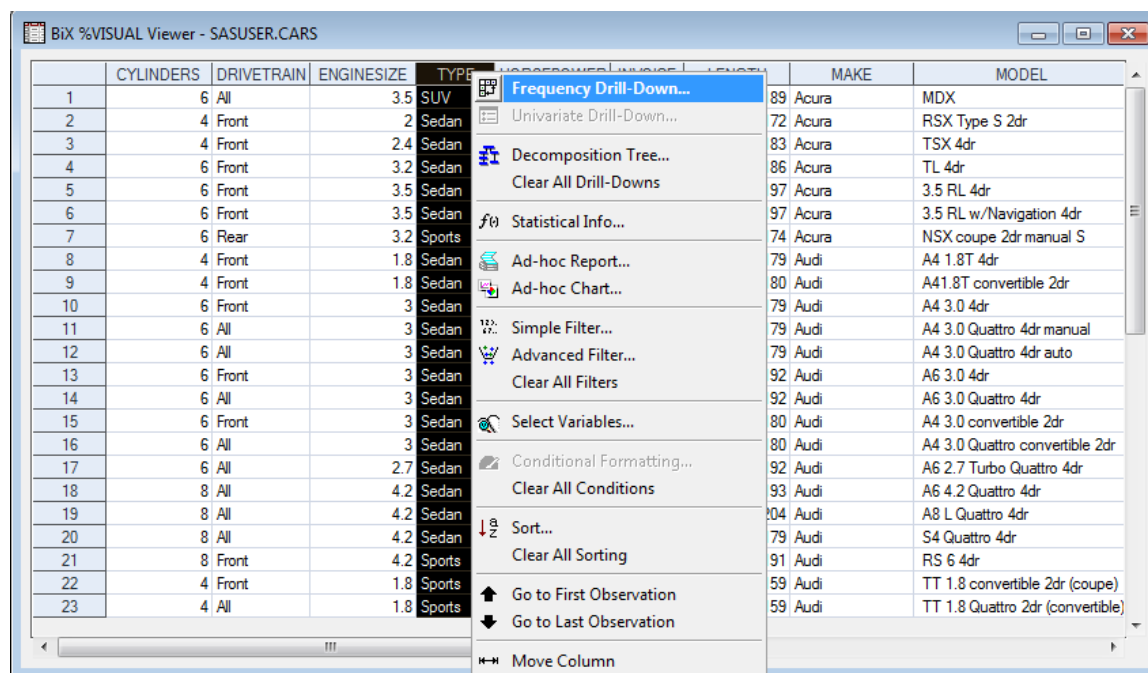
Overview

Understanding the report
 Understanding the Pie Chart
 Understanding the Bar Chart
 Drilling from the report
 Drilling from charts
 Selecting Sum Variable
 Printing
 Saving as SAS data set

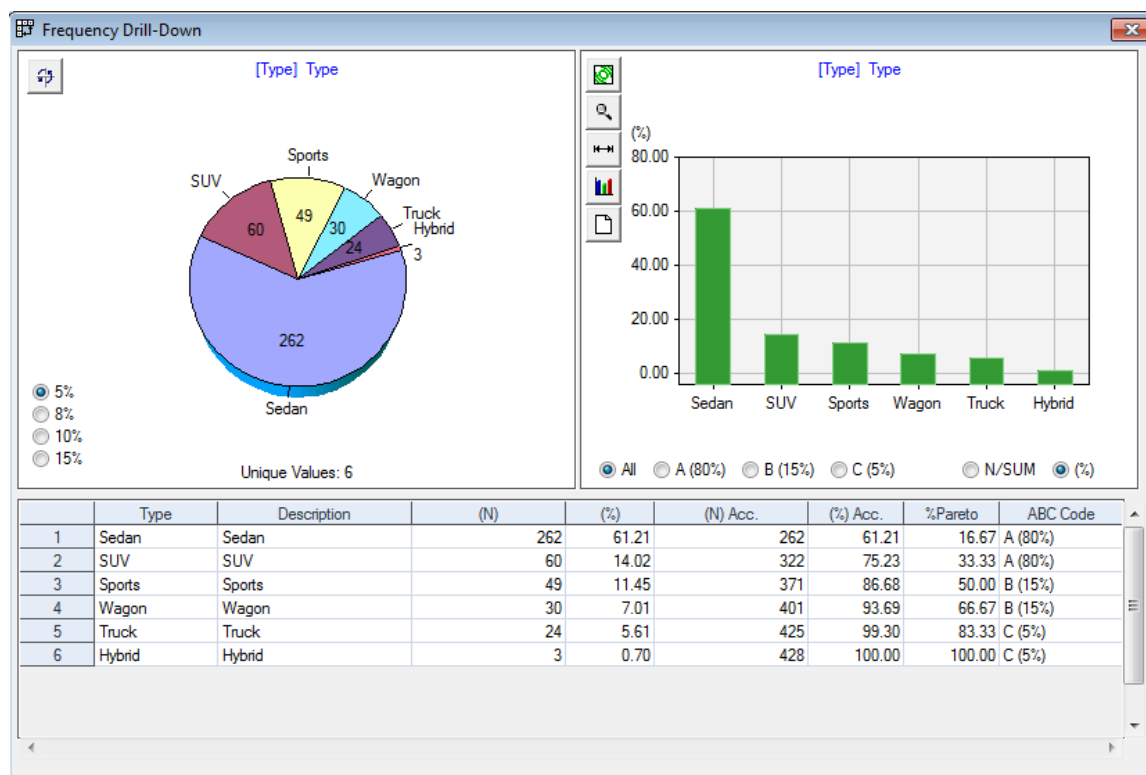
Overview

Frequency Drill-Down is a method to explore the distribution of values of a numeric or character variable with a set of ordinal values. ("Payment Status", "Customer Type", "Credit Date" etc.) Usually these kind of variable will have a user-defined format or a date format associated with them.

In order to drill-down on a variable you must first highlight that variable by selecting its column header and select "Frequency Drill-Down..." option from the pop menu:



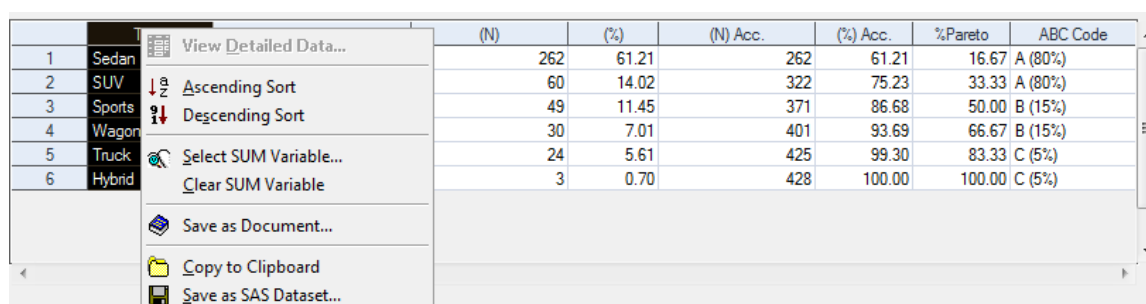
The following "Frequency Drill-Down" window will be displayed:



The "Frequency Drill-Down" window shows Frequency statistics computed "on the fly" for the selected variable both in an interactive report and in an interactive graphic format. There is no need to make any preparations in the data set in order to do a drill-down on any variable. Frequency drill-down can be done on both numeric and char variables. One of the main advantages of the %Visual drill-down windows is that they allow you to continue with interactive drilling on any value(s) and variable(s) as will be described in the following sections.

Understanding the report

The bottom part of the window shows a report with all distinct values found while scanning the variable. If the variable has an associated format, then the internal unformatted value is shown on the left most column and followed by the formatted value (The description column). If there is no format, then both columns shows the same value. Next comes the column (N) which shows the count value of each specific value. The rest of the columns shows percentages of each values, accumulated count and percentages. By default, the report is sorted by descending count showing at the top row the value with the highest count value. You can use the pop menu of the report to sort it in other ways, for example by its value rather than (N), if for example, you want to find a specific value in a long list. Sorting the report recalculates the accumulated statistics.



The two most right columns shows two interesting values:

%Pareto

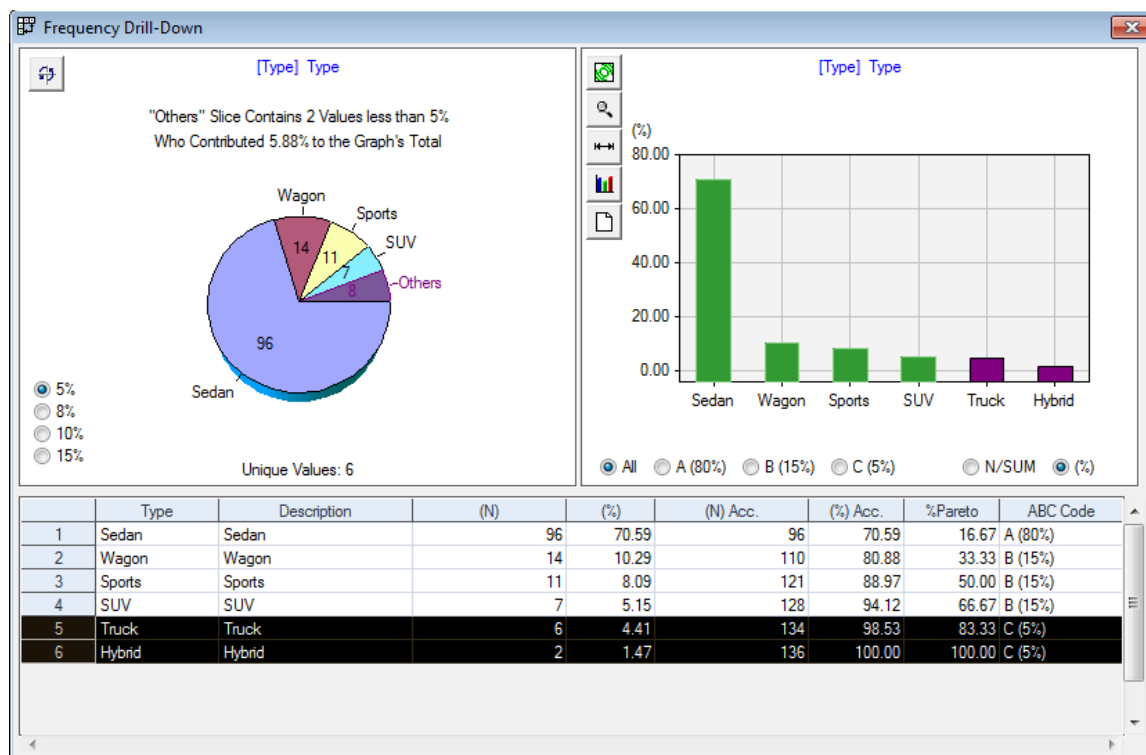
The Pareto rule (named after an Italian researcher Vilfredo Pareto 1848-1923 and also known as the 80/20 rule) is calculated in this column. Thus allowing to see where 20% of the accumulated distinct values contributes to 80% of the accumulated frequency. For example, 20% of customers contributes more than 80% of revenues, or as another example: 20% of complain reasons in a CRM contact center creates 80% of the total telephone incoming calls.

ABC Code

The ABC coding system is similar to Pareto and it is mostly used in inventory control. The "A" code represents 80% of total frequency, the "B" code represents the next 15% and the "C" code represents the last 5% of frequency.

Understanding the Pie Chart

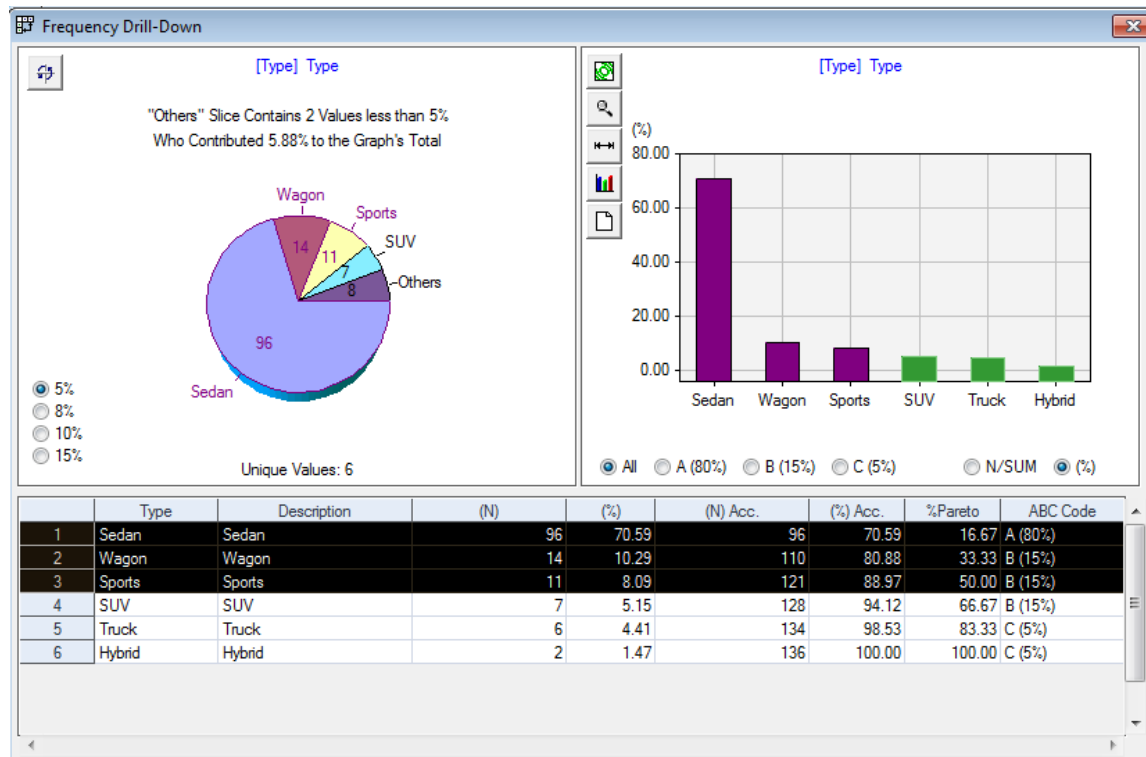
The Pie chart shows distinct values as slices in a pie. Values that have a frequency of less than 5% are grouped together to form the "Other" slice. You can control the value of threshold for the "Other" slice by picking different value from the radio-box located inside the pie area. If slice labels overlaps, you can rotate the pie so slice labels will have more space one from the other. Clicking on one slice in the pie, will highlight its corresponding value in the report and vice versa. You can select multiple slices or multiple rows in the report by holding the CTRL key while picking slices or rows.



In the above example, the "Other" slice was selected (notice that a selected slice changes its label color) and immediately, all corresponding values in the report were also highlighted. Notice that all those highlighted values has a percentage of less than 5% and thus they are all belonging to the "Other" slice in the pie.

Understanding the Bar Chart

The bar chart shows all distinct values as an interactive bar chart. Values selected in the report or pie highlights bars in the Pareto chart and vice versa.



You can use the radio-box selector to control which values are displayed according to the ABC scheme.

Drilling from the report

The most amazing feature of the Drill-Down windows of %Visual is that they allow further drilling on any value(s) to view the detailed observations forming those values. Select (highlight) a value (or group of values with the use of the CTRL key) and open the pop menu as displayed in the following figure:

	Make	Description	(N)	(%)	(N) Acc.	(%) A
1	Toyota	Toyota	28	6.54	28	6.54
2	Chevrolet	Chevrolet	27	6.31	55	****
3	Mercedes-Benz	Mercedes-Benz	26	6.07	81	****
4	Ford	Ford	23	5.37	104	****
5	BMW	BMW	20	4.67	124	****
6	Audi	Audi	19	4.44	143	****
7	Honda	Honda	17	3.87	160	****
8	Nissan	Nissan				
9	Chrysler	Chrysler				
10	Volkswagen	Volkswagen				
11	Dodge	Dodge				
12	Mitsubishi	Mitsubishi				
13	Hyundai	Hyundai				
14	Jaguar	Jaguar				
15	Volvo	Volvo				
16	Kia	Kia				
17	Lexus	Lexus				
18	Mazda	Mazda				
19	Pontiac	Pontiac				
			11	2.57	313	

The "View Detailed Data..." pop menu option will re-display the "%Visual Viewer" window with only the observations belonging to those previously selected values. You can now select a different variable and perform again a drill-down operation to further investigate values of the secondly chosen variable based upon prior selection:

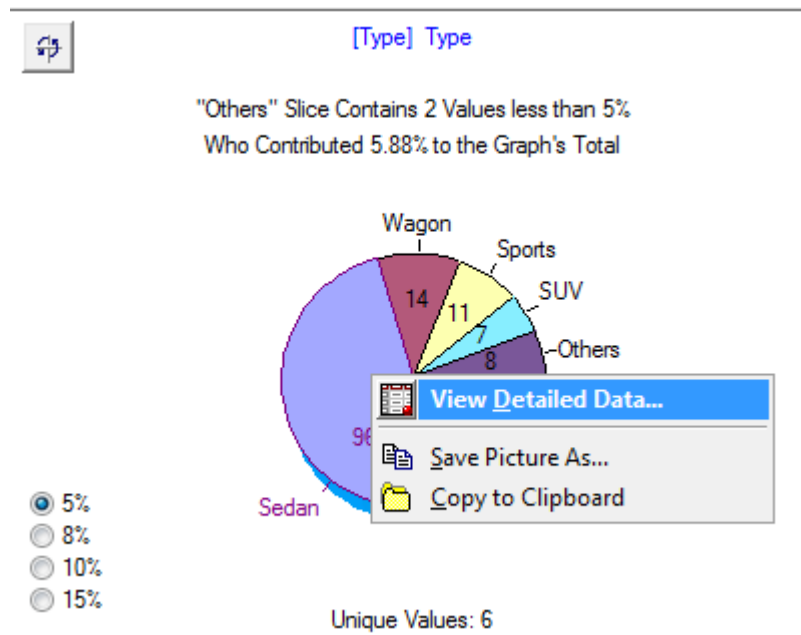
	MAKE	MODEL	TYPE	ORIGIN	DRIVE TRAIN	MSRP	INVOICE	ENGINE SIZE	CYLI
1	Honda	Civic Hybrid 4dr manual (gas/electric)	Hybrid	Asia	Front				4
2	Honda	Insight 2dr (gas/electric)	Hybrid	Asia	Front				3
3	Honda	Pilot LX	SUV	Asia	All				6
4	Honda	CR-V LX	SUV	Asia	All				4
5	Honda	Element LX	SUV	Asia	All				4
6	Honda	Civic DX 2dr	Sedan	Asia	Front				4
7	Honda	Civic HX 2dr	Sedan	Asia	Front				4
8	Honda	Civic LX 4dr	Sedan	Asia	Front				4
9	Honda	Accord LX 2dr	Sedan	Asia	Front				4
10	Honda	Accord EX 2dr	Sedan	Asia	Front				4
11	Honda	Civic EX 4dr	Sedan	Asia	Front				4
12	Honda	Civic Si 2dr hatch	Sedan	Asia	Front				4
13	Honda	Accord LX V6 4dr	Sedan	Asia	Front				6
14	Honda	Accord EX V6 2dr	Sedan	Asia	Front				6
15	Honda	Odyssey LX	Sedan	Asia	Front				6
16	Honda	Odyssey EX	Sedan	Asia	Front				6
17	Honda	S2000 convertible 2dr	Sports	Asia	Rear				4
18	Toyota	Prius 4dr (gas/electric)	Hybrid	Asia	Front				4
19	Toyota	Sequoia SR5	SUV	Asia	All				8
20	Toyota	4Runner SR5 V6	SUV	Asia	Front				6
21	Toyota	Highlander V6	SUV	Asia	All				6

Notice that in the above figure only "Honda" or "Toyota" cars are displayed according to the two values selected before. You can now continue to drill-down on any other variable. In the above example we selected the "Drive Train" variable to further drill-down.

There is no limit on the number of drill-down operations one can take in order to explore and analyze data. Drill-down can be done as a frequency drill-down or univariate drill-down method (Explained in the next section).

Drilling from charts

The same drilling functionality is available by picking slice(s) from the pie or bar charts.



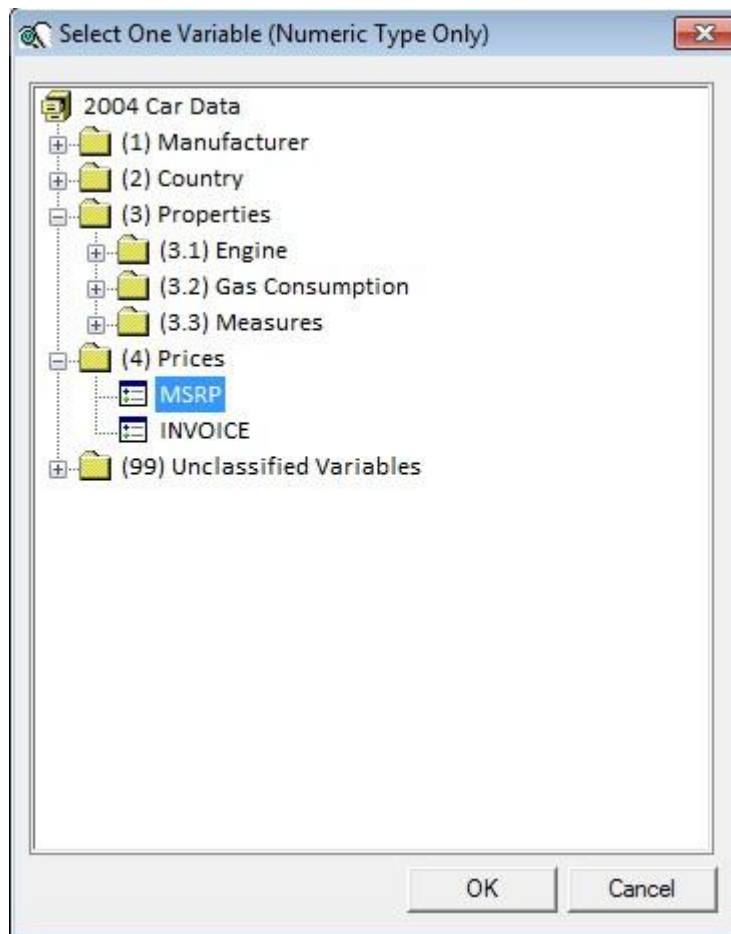
Selecting Sum Variable

If you want to view "Sum" statistics for the distribution of values then select the variable by selection the option "Select Sum Variable..." from the pop menu of the report section as described in the following figure:

	Make	Description	(N)	(%)	(N) Acc.	(%) A
1	Toyota	Toyota	28	6.54	28	6.54
2	Chevrolet	Chevrolet	27	6.31	55	****
3	Mercedes-Benz	Mercedes-Benz	26	6.07	81	****
4	Ford	Ford	25	5.93	106	****
5	BMW	BMW	24	5.79	130	****
6	Audi	Audi	23	5.65	153	****
7	Honda	Honda	22	5.51	175	****
8	Nissan	Nissan	21	5.37	196	****
9	Chrysler	Chrysler	20	5.23	216	****
10	Volkswagen	Volkswagen	19	5.09	235	****
11	Dodge	Dodge	18	4.95	253	****
12	Mitsubishi	Mitsubishi	17	4.81	270	****
13	Hyundai	Hyundai	16	4.67	286	****
14	Jaguar	Jaguar	15	4.53	301	****
15	Volvo	Volvo	14	4.39	315	****
16	Kia	Kia	11	2.57	280	****
17	Lexus	Lexus	11	2.57	291	****
18	Mazda	Mazda	11	2.57	302	****
19	Pontiac	Pontiac	11	2.57	313	****

View Detailed Data...
Ascending Sort
Descending Sort
Select SUM Variable...
Clear SUM Variable
Save as Document...
Copy to Clipboard
Save as SAS Dataset...

Select, for example, the "MSRP" variable:



The report and chart will display summary statistics for the selected sum variable.

Note: The following Frequency drill downs will keep displaying the sum value until you clear that selection.

Note: The above window shows variables organized into hierarchies. This feature requires BiX Meta-Data Server license (Not included with %visual macro).

Printing

Printing from the graph object

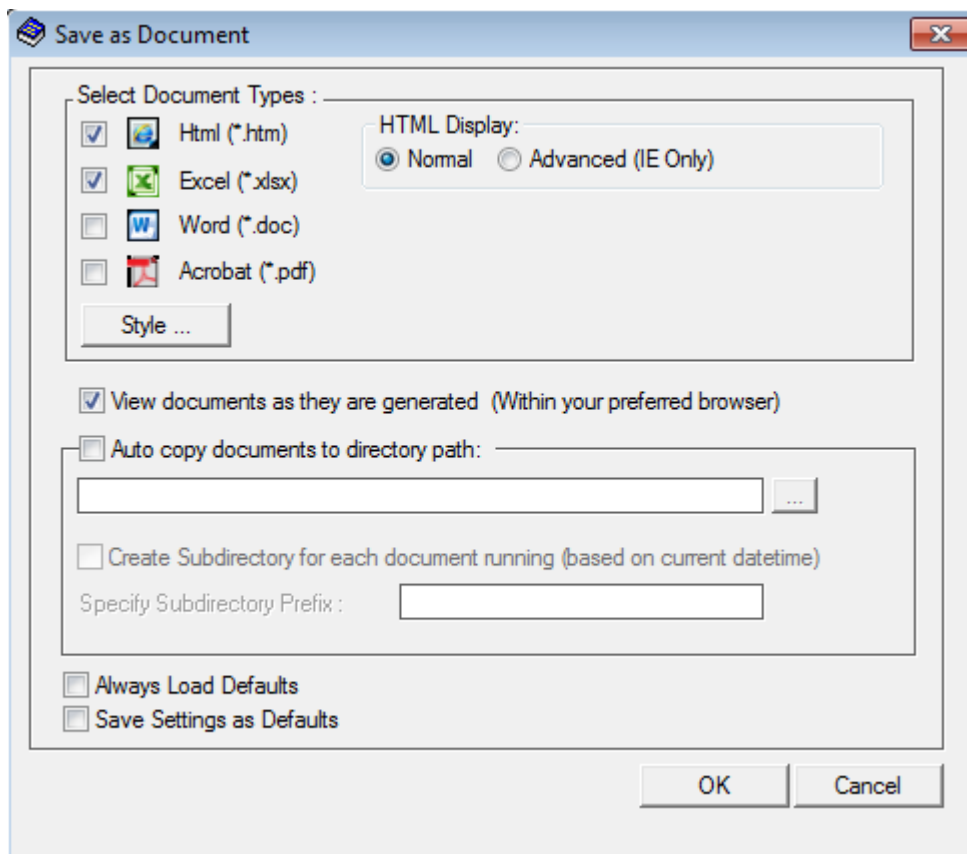
If you open the pop menu of a graph object (Pie or Pareto) then you can save the graphic output to a *.png file on your computer using the "Save Picture As..." option or you can immediately copy the graph to the MS Window clipboard and then paste it to other office application (Power Point, Word) or other MS Windows compliant applications.

Printing from the report object

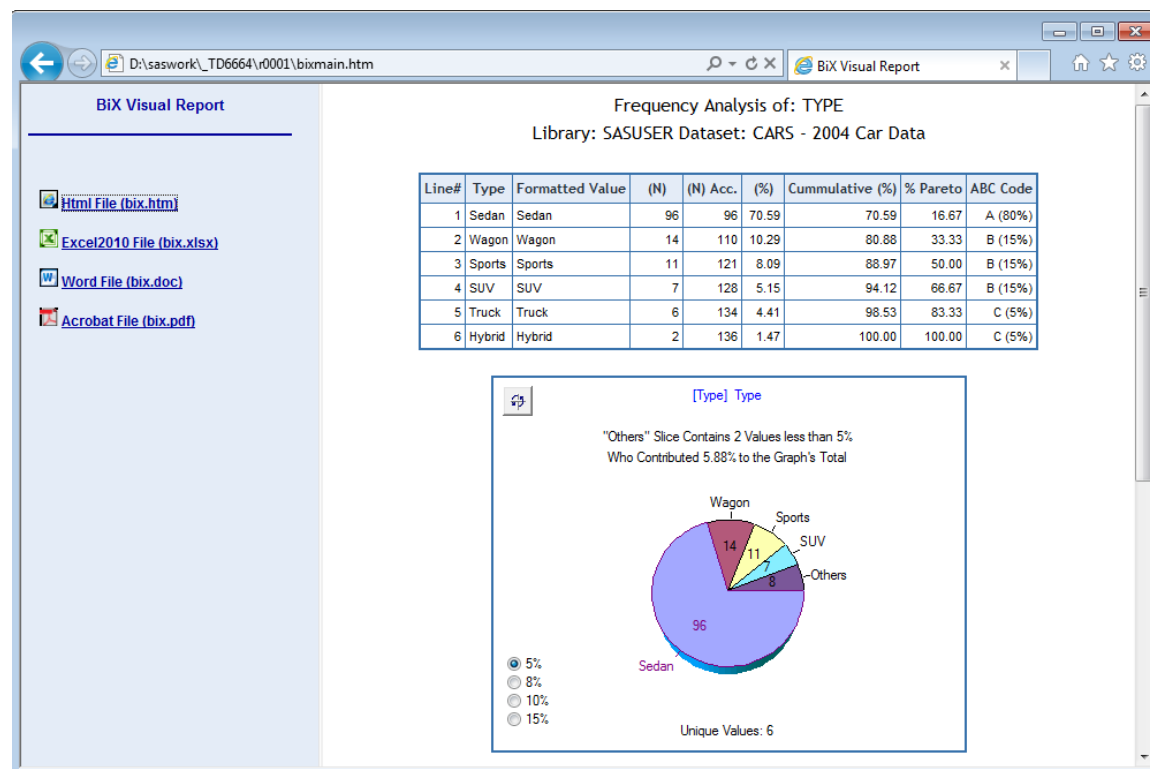
Saving the report as Document will allow the use of %Visual document management system:

	Make	Description	(N)	(%)	(N) Acc.	(%) A
3	Mercedes-Benz	Mercedes-Benz	26	6.07	81	****
4	Ford	Ford	23	5.37	104	****
5	BMW	BMW	20	4.67	124	****
6	Audi	Audi	19	4.44	143	****
7	Honda	Honda	17	3.97	160	****
8	Nissan	Nissan	17	3.97	177	****
9	Chrysler	Chrysler				
10	Volkswagen	Volkswagen				
11	Dodge	Dodge				
12	Mitsubishi	Mitsubishi				
13	Hyundai	Hyundai				
14	Jaguar	Jaguar				
15	Volvo	Volvo				
16	Kia	Kia				
17	Lexus	Lexus				
18	Mazda	Mazda				
19	Pontiac	Pontiac				
20	Subaru	Subaru				
21	Buick	Buick	9	2.10	333	****

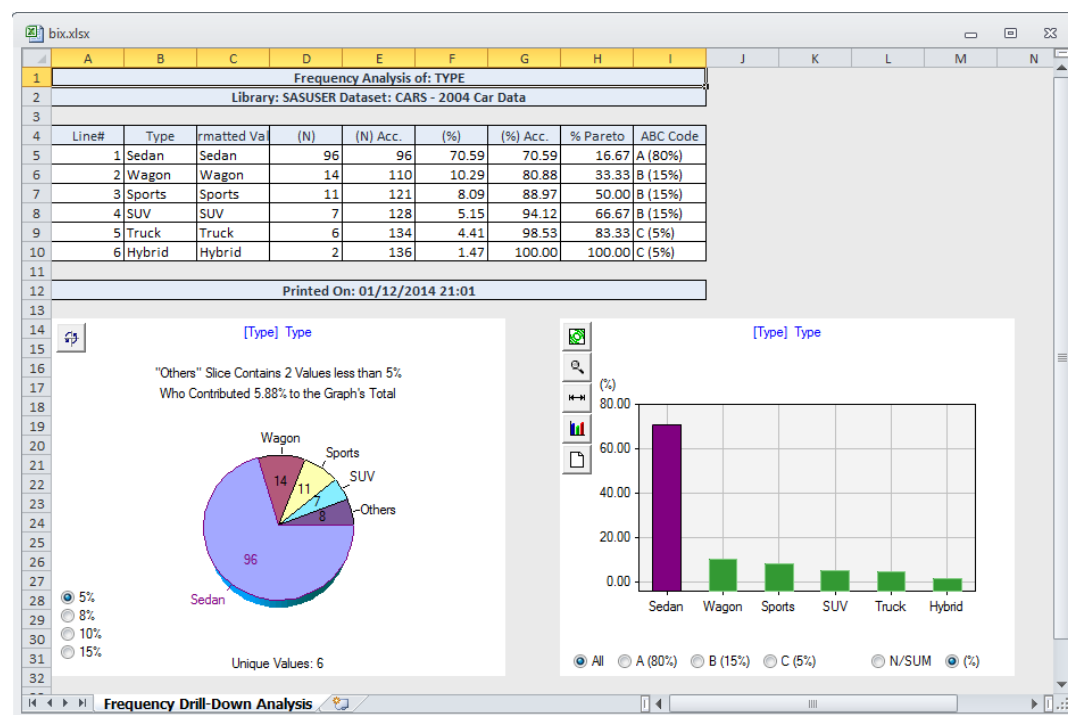
%Visual document management system allow to select up to 4 types of documents that can be produced simultaneously:



The output will be shown within your preferred browser as displayed in the following figure. The HTML document is shown by default, and you can switch to other types of documents by pointing to the appropriate link on the left contents part of the web page.

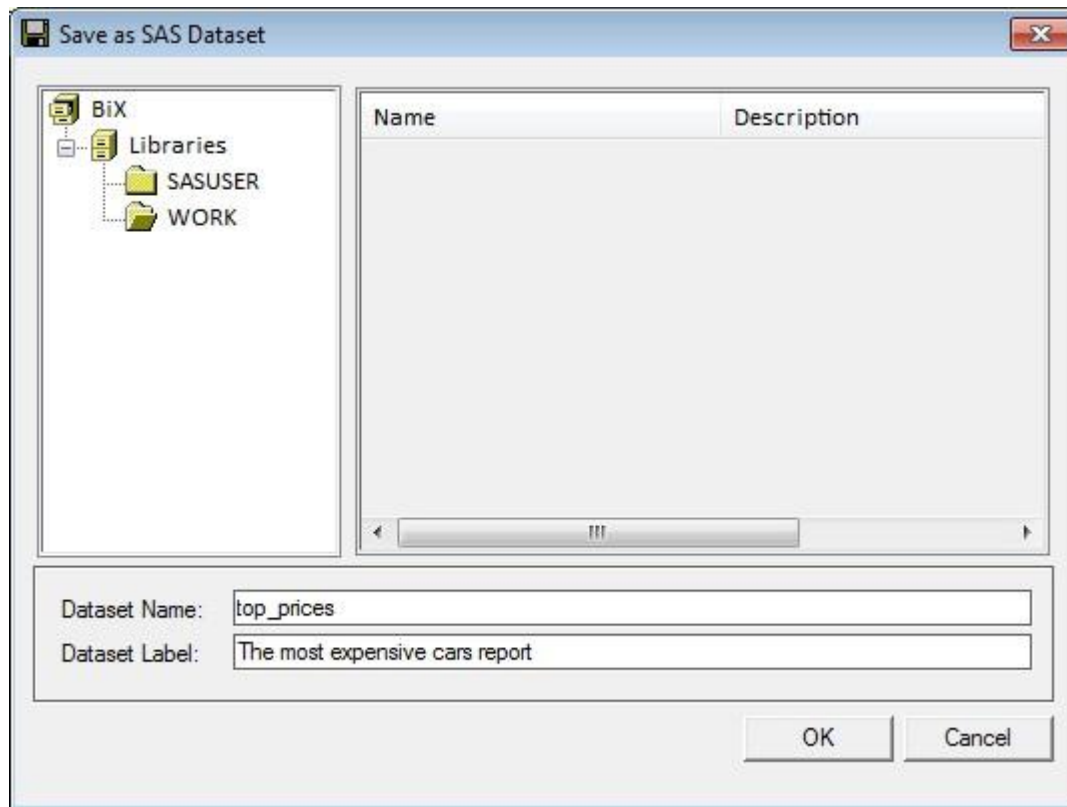


Depending of the type of document, %Visual will place both the report and the graph from the Frequency Drill-Down window as displayed in the following Excel2010 document created by %Visual document management system. If the report is a long one, then the graph will be placed on the right side of the sheet. If the report is a short one (several rows) then the graph will be placed below the report.



Saving as SAS Data set

Saves the data of the analysis (The report part of the window) as a newly created SAS data set, thus allowing you to continue manipulating the data.



Univariate Drill-Down

Overview

Understanding the report

Understanding the density Chart

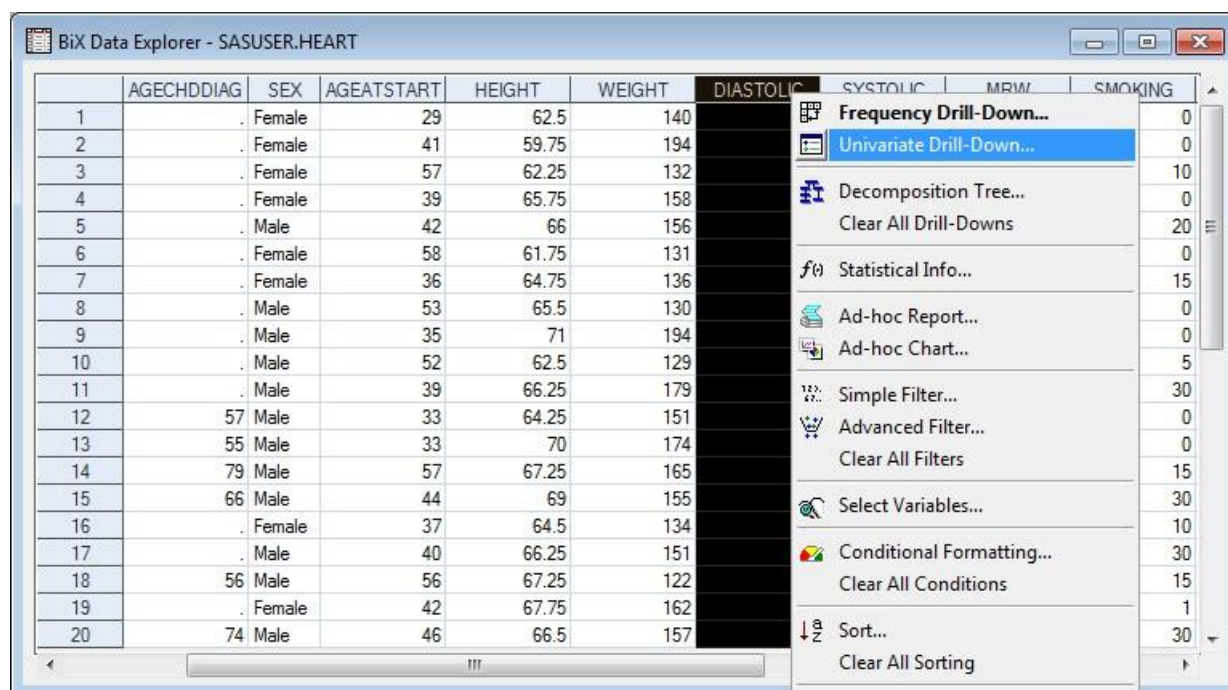
Drilling from the report

Drilling from the chart

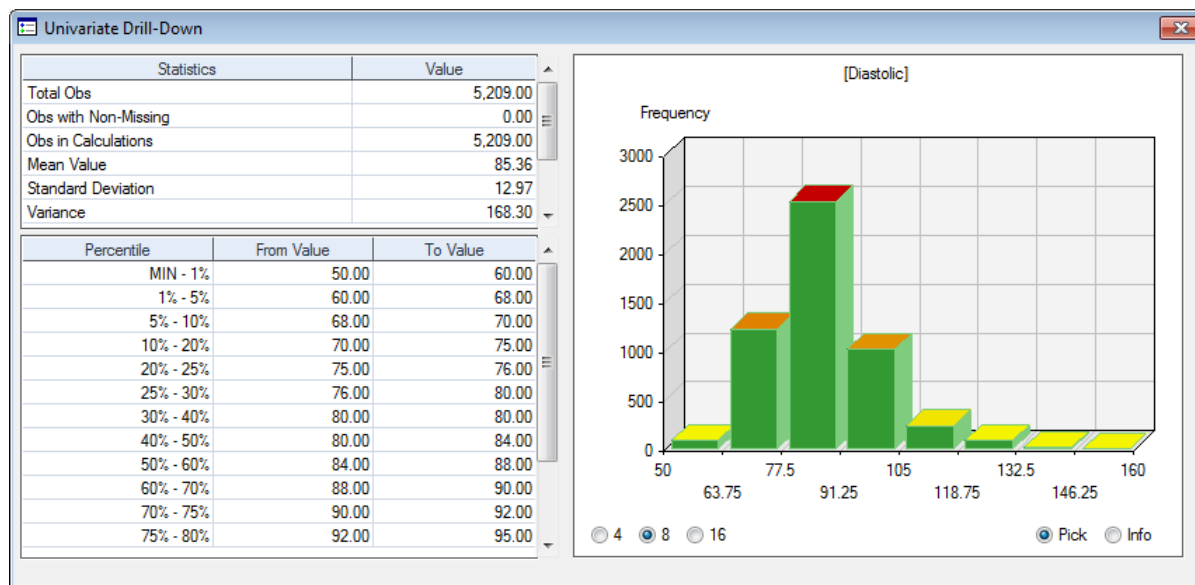
Printing

Overview

Univariate Drill-Down is a method to explore distribution of values of a numeric variable having continuous values. ("Budget", "Temperature", "Blood pressure", "Weight" etc.). In order to drill-down on a variable you must highlight that variable by selecting its column header and select "*Univariate Drill-Down...*" option from the pop menu as displayed in the following figure:



The Univariate Drill Down (Based on SAS PROC Univariate statistics) will display the following window:



Understanding the report

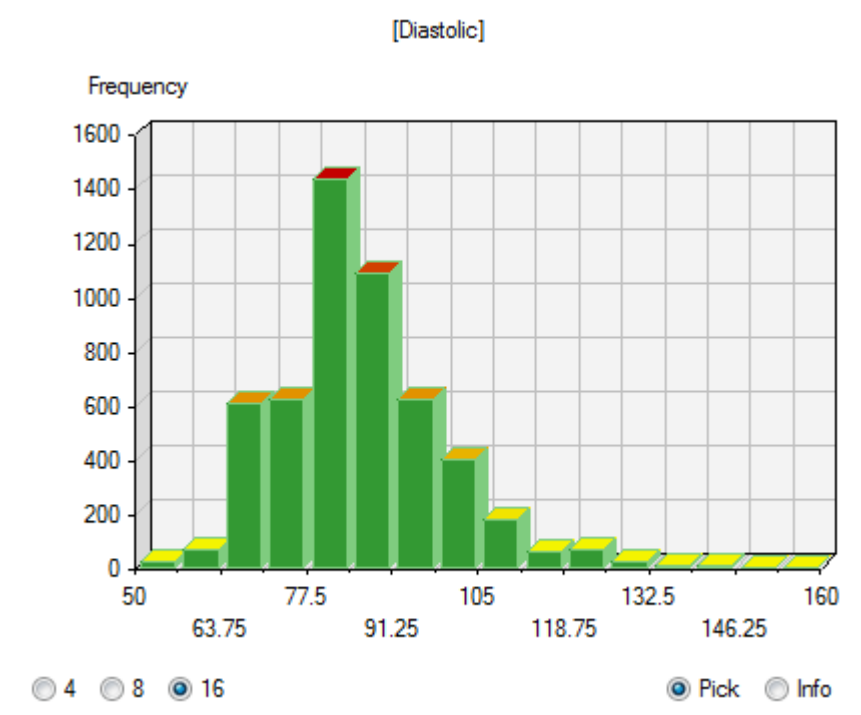
The left side of the window consist of two sub reports. The upper report is a static report which displays a set of commonly used statistical measures calculated on the variable current values. The lower report is a dynamic interactive report which displays percentiles calculation. Rows of this report can be selected for further drill-down.

Statistics	Value
Total Obs	5,209.00
Obs with Non-Missing	0.00
Obs in Calculations	5,209.00
Mean Value	85.36
Standard Deviation	12.97
Variance	168.30

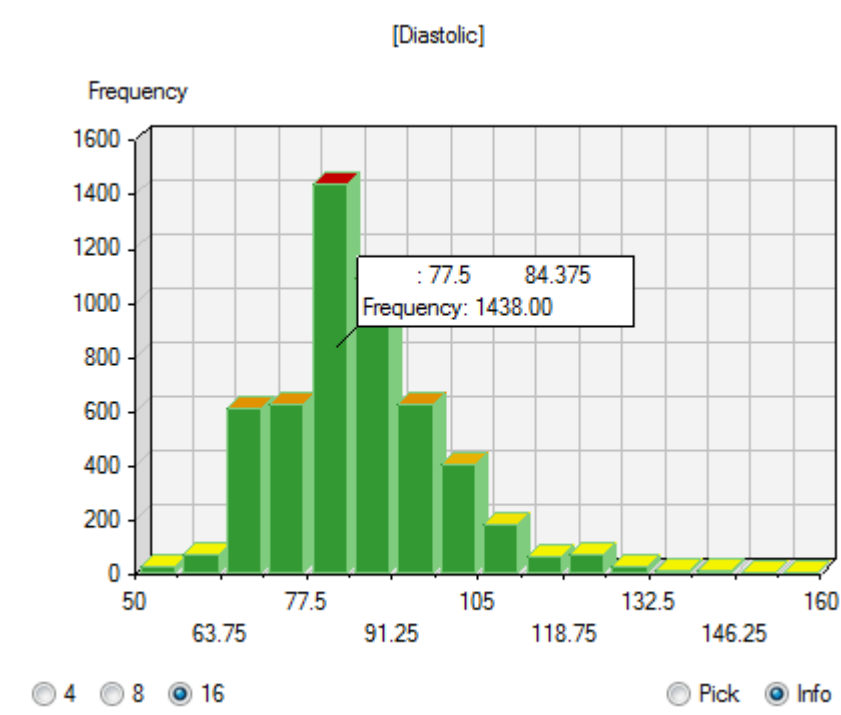
Percentile	From Value	To Value
MIN - 1%	50.00	60.00
1% - 5%	60.00	68.00
5% - 10%	68.00	70.00
10% - 20%	70.00	75.00
20% - 25%	75.00	76.00
25% - 30%	76.00	80.00
30% - 40%	80.00	80.00
40% - 50%	80.00	84.00
50% - 60%	84.00	88.00
60% - 70%	88.00	90.00
70% - 75%	90.00	92.00
75% - 80%	92.00	95.00

Understanding the Density Chart

The density chart displays the range of values from the lowest to highest divided by 4, 8 or 16 equally sub-sections. The bar value represents the amount of values within these ranges. You can quickly see where values are concentrated and if the distribution of values is of normal form.



You can select the "Info" options which will cause a little tool tip to be open whenever you select a bar from the chart as shown in the following figure:

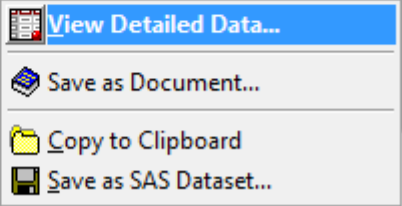


Drilling from the report

The lower report can be used to interactively select the desired sub-sections of percentiles and to drill-down to see those detailed rows. In the following figure we have selected the middle range of values between the 25% percentile to the 75% percentile. Drilling-Down to view detailed data will display only those selected values. You can select multiple rows by using the CTRL key.

Statistics	Value
Total Obs	5,209.00
Obs with Non-Missing	0.00
Obs in Calculations	5,209.00
Mean Value	85.36
Standard Deviation	12.97
Variance	168.30

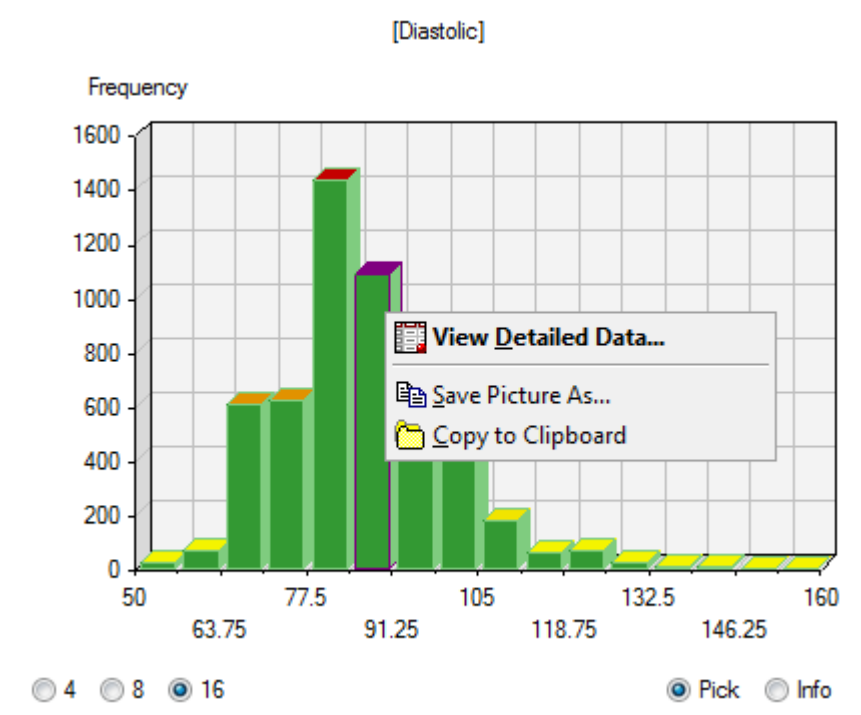
Percentile	From Value	To Value
1% - 5%	60.00	68.00
5% - 10%	68.00	70.00
10% - 20%	70.00	75.00
20% - 25%	75.00	76.00
25% - 30%	76.00	80.00
30% - 40%		
40% - 50%		
50% - 60%		
60% - 70%		
70% - 75%		
75% - 80%		
80% - 90%	95.00	100.00



- View Detailed Data...
- Save as Document...
- Copy to Clipboard
- Save as SAS Dataset...

Drilling from the chart

A bar (or set of bars selected with CTRL key pressed) can be used to drill-down to see detailed values. Notice that in order to select a bar the "Pick" option must be first selected.



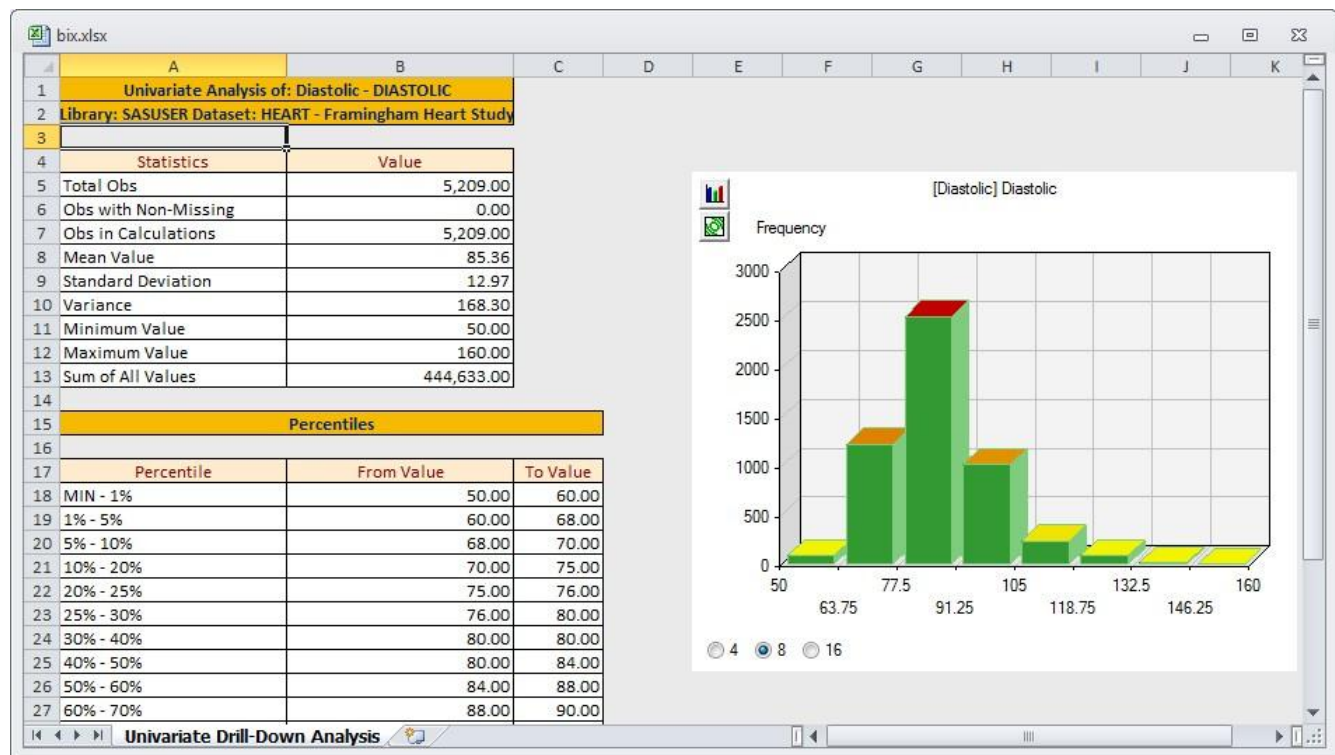
Printing

Printing from the graph object

If you open the pop menu of a graph object then you can save the graphic output to a *.png file on your computer using the "Save Picture As..." option or you can immediately copy the graph to the MS Window clipboard and then paste it to other office application (Power Point, Word) or other MS Windows compliant applications.

Printing from the report object

Saving the report as Document will allow the use of %Visual document management system:



Decomposition Tree

Overview

The Root Node

The Filter Node

Frequency Nodes

Univariate Nodes

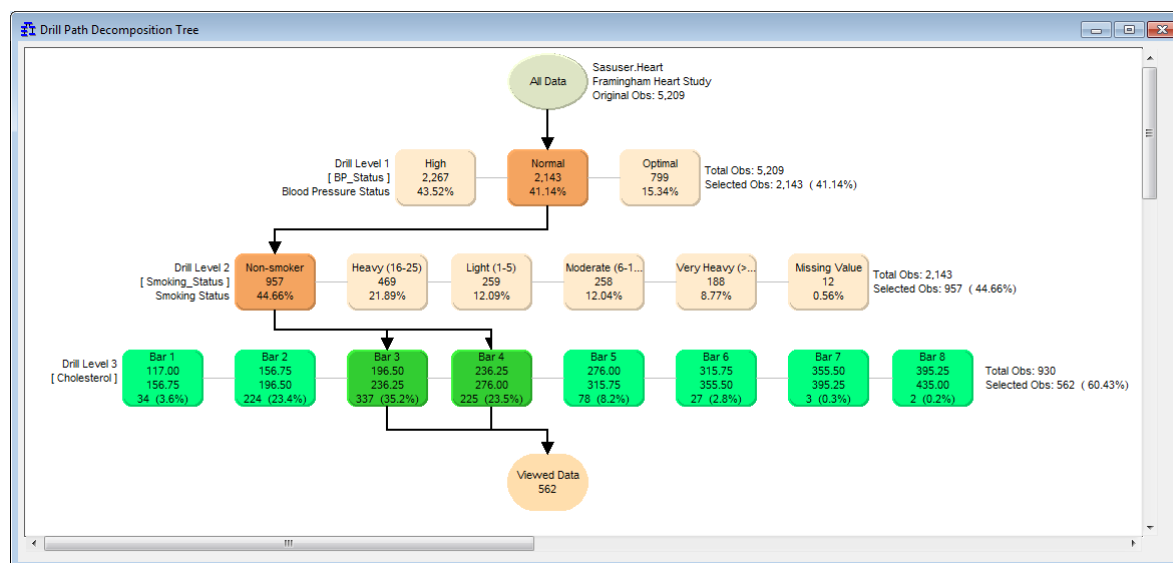
The Viewed Data Node

Saving and Printing the Decomposition tree

Changing Attributes

Overview

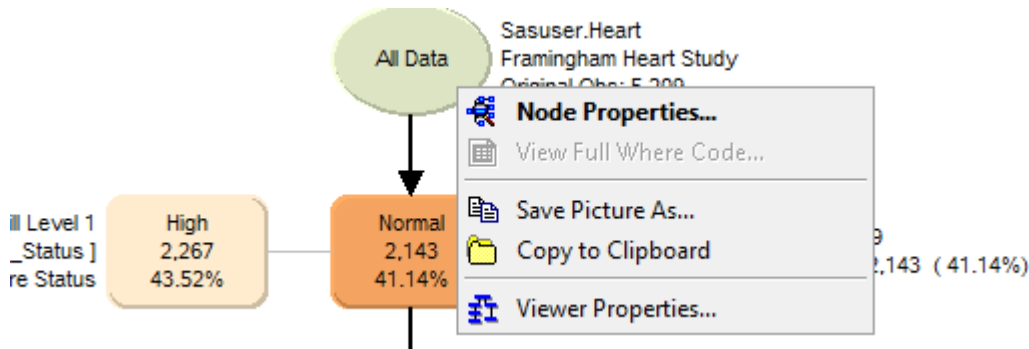
The "Drill Path Decomposition Tree" window shows in a unique graphical layout the complete drill path of both the frequency and univariate drill-down selections along with all possible values which were not selected. The initial Filter code applied to the %Visual Viewer window is also shown. The final SAS "Where" statement can be accessed and copied to other windows or SAS programs.



The decomposition tree is a dynamic view created "on the fly" from your drill-down selections. The tree is composed of "Nodes" representing the values revealed in the drill-down process. Values selected in each step are pointed by arrows. Text label on the left side of each row indicates the drill level and the name of the variable selected for that level. The text on the right side lists statistics about total observations and selected observations in each step. Nodes in the diagram have pop menu actions attached to.

The Root Node

The root node indicates the data set selected for the analysis. clicking on the root node opens a pop menu with the following options:



Clicking on the "Node Properties..." options opens the "Data Set Properties".

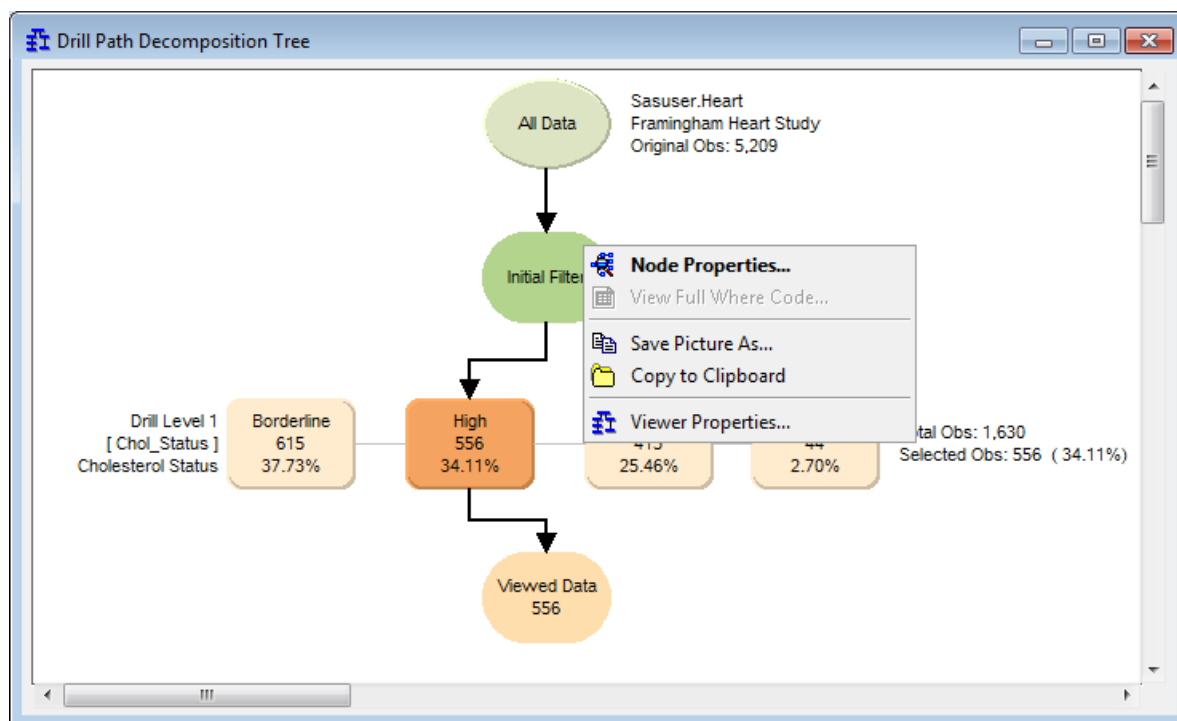
The Filter Node

If a filter (Simple and/or Advanced one) is assigned to the data prior to starting the drill-down process, then a special node will be inserted after the Data node, where you can pop a menu to view these filter as shown in the following example where prior to starting to explore values, the user has decided to select patients above age 35 (using the "Advanced filter window") and use simple filter to select patients with blood pressure equals "Normal".

BiX Data Explorer - SASUSER.HEART

	Age at Death	Age at Start	Age CHD Diagnosed	Blood Pressure Status	Cause of Death	Cholesterol	C
1	.	39	.	Normal		242	H
2	.	36	.	Normal		196	D
3	77	53	.	Normal	Other	276	H
4	82	52	.	Normal	Cerebral Vascular Disease	284	H
5	.	39	.	Normal		225	B
6	.	57	79	Normal		.	.
7	.	37	.	Normal		196	D
8	.	40	.	Normal		192	D
9	72	56	56	Normal	Cancer	194	D
10	.	45	.	Normal		209	B
11	.	36	.	Normal		184	D
12	.	42	.	Normal		221	B
13	.	40	68	Normal		319	H
14	.	40	68	Normal		205	B
15	.	39	.	Normal		196	D
16	.	39	.	Normal		161	D
17	.	45	.	Normal		209	B
18	.	52	.	Normal		246	H
19	71	39	.	Normal	Cancer	205	B

When you start to drill-down on that filtered data set, the decomposition tree will show a separate "Initial Filter" node as displayed in the following Figure:



The "Node Properties..." option for a "Initial Filter" node opens a window with all "Where" clauses gathered from simple filters as well as from the Advanced filter. They are presented in a text format so you can easily cut&paste the code into other SAS windows or applications.

View Full Where Code

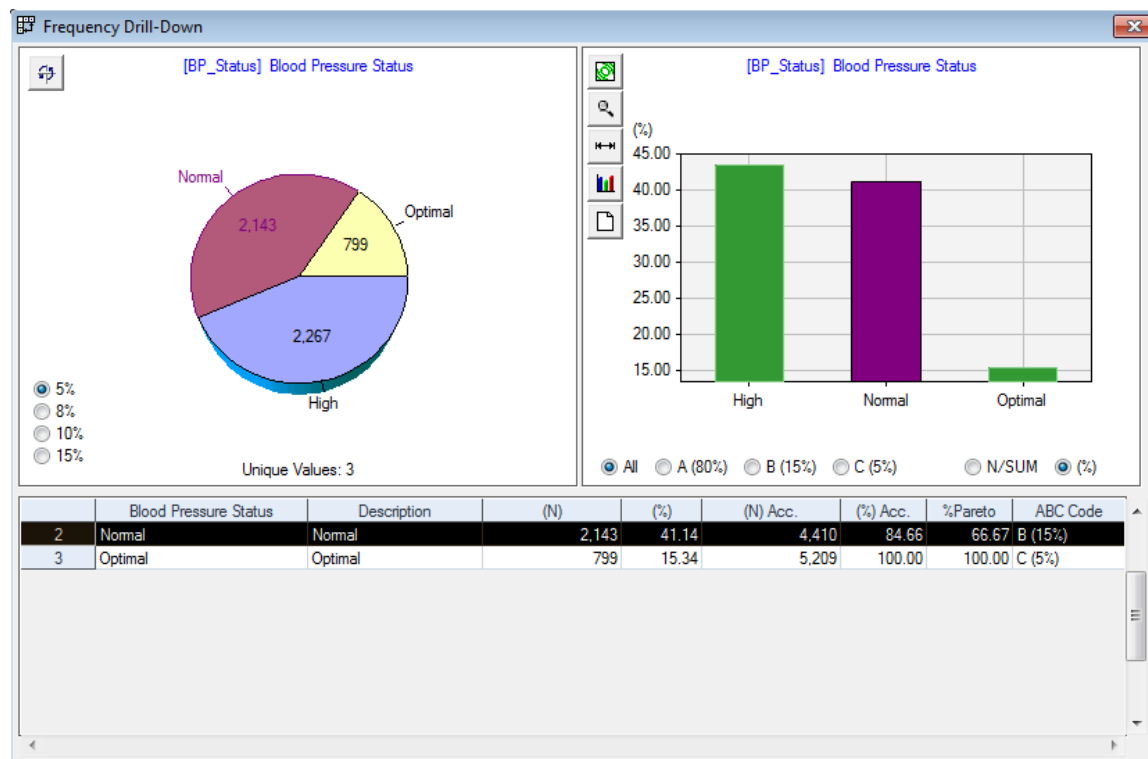
```
WHERE
/* --- Advanced Filter Clauses -----*/
AGEATSTART > 35
/* --- Simple Filter Clauses -----*/
AND
  BP_STATUS in ( "Normal" )
```

Goback

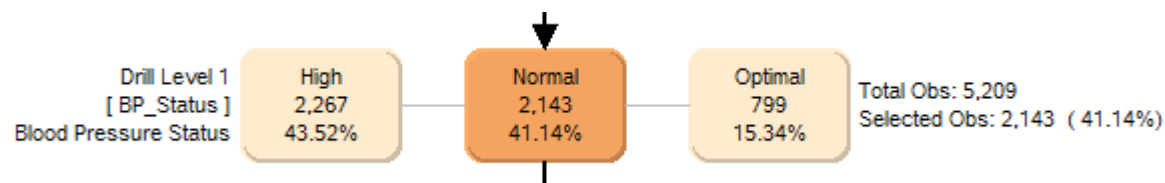
Warning: Only one node of Filter code can appear in the decomposition tree. It is mostly recommended that you define all your filters needed for the analysis in the first initial filter. Although filters can be changed or receive more clauses during the drill-down process, this might cause inaccurate values to be shown in the diagram.

Frequency Nodes

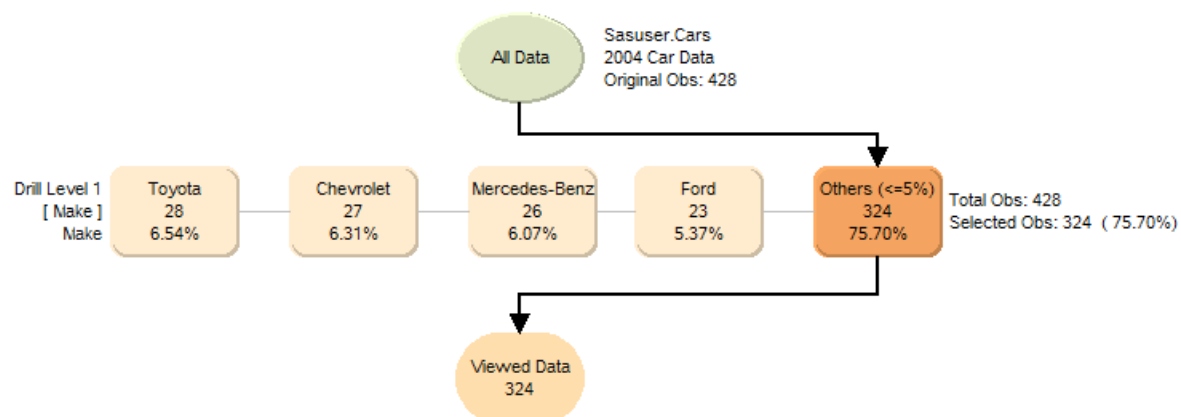
Each node represents a slice in the pie chart of the "Frequency Drill-Down" window shown below:



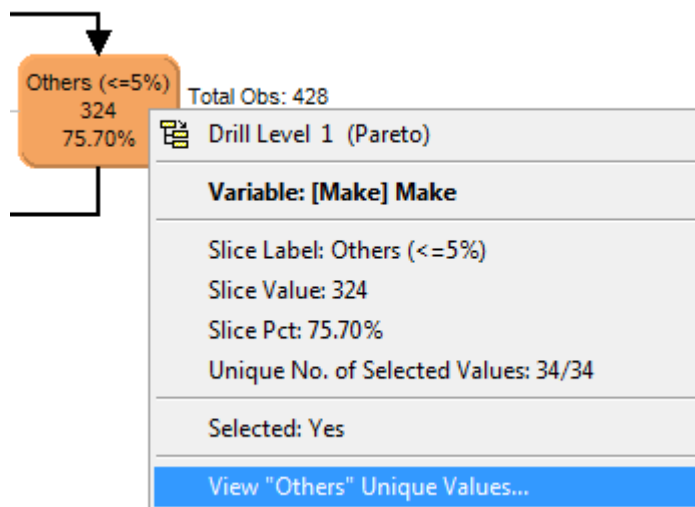
The selected slices are pointed with an arrow(s) as shown in the following figure:



If a frequency analysis has a slice in the pie denoting "Other" values (Usually values with less than 5% contribution of the total), then those "Other" values are shown in a specific node shown below:



When opening the pop menu on the "Others" node, you can select the option "View 'Others' Unique Values..." to get a full list of all values included within the "Other" slice.



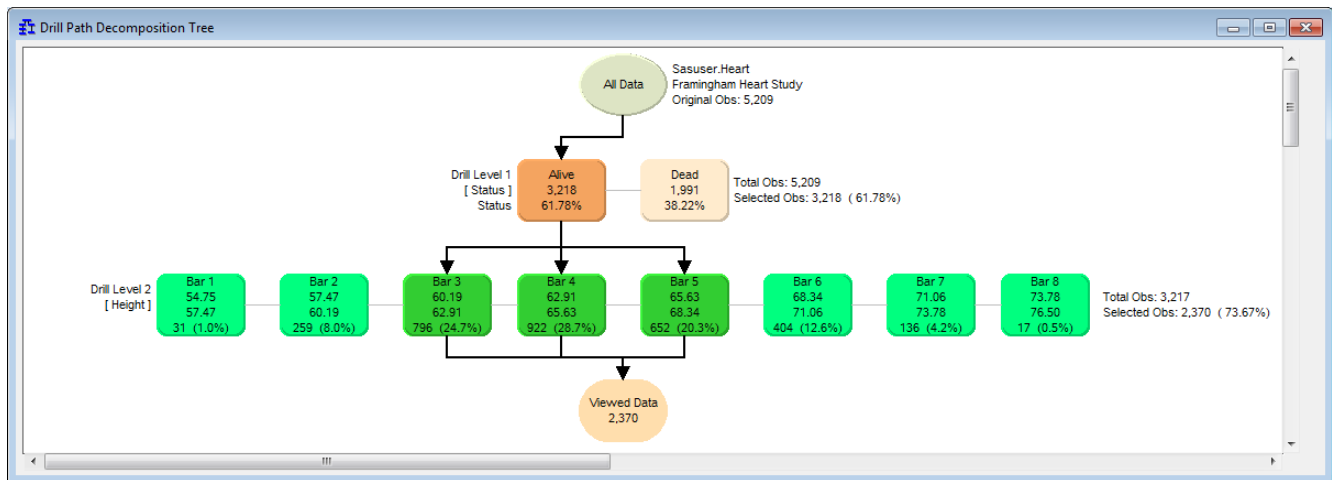
Which shows a window listing all detailed values belonging to the "Others" slice:

The screenshot shows a window titled "Others Unique Values" with a table listing car makes and their counts. The table has five columns: Selected, Label, Value, and Pct (%).

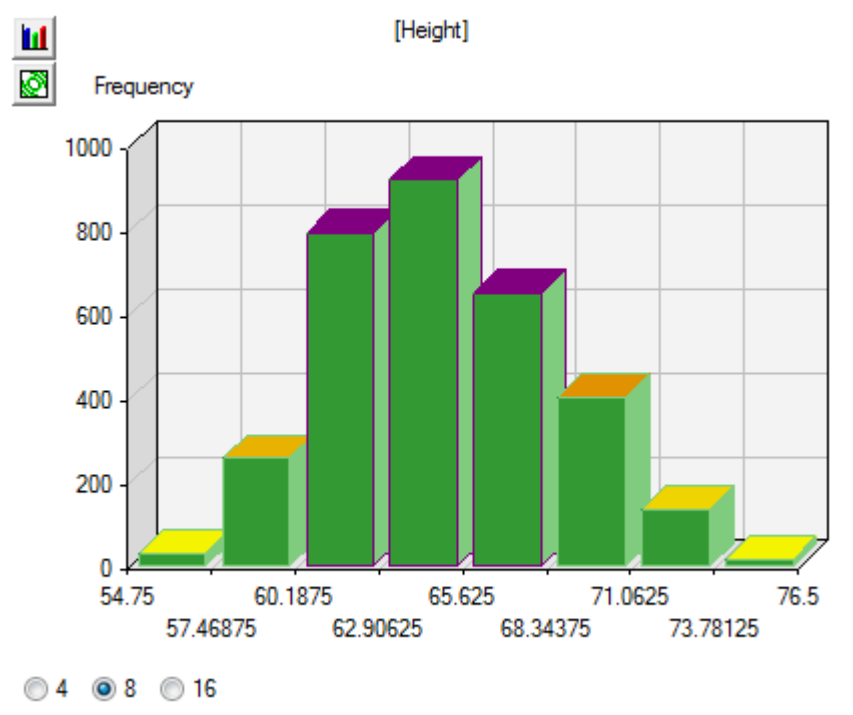
	Selected	Label	Value	Pct (%)
0001	N	BMW	20	4.67
0002	N	Audi	19	4.44
0003	N	Honda	17	3.97
0004	N	Nissan	17	3.97
0005	N	Chrysler	15	3.50
0006	N	Volkswagen	15	3.50
0007	N	Dodge	13	3.04
0008	N	Mitsubishi	13	3.04
0009	N	Hyundai	12	2.80
0010	N	Jaguar	12	2.80
0011	N	Volvo	12	2.80
0012	N	Kia	11	2.57
0013	N	Lexus	11	2.57
0014	N	Mazda	11	2.57
0015	N	Pontiac	11	2.57
0016	N	Subaru	11	2.57
0017	N	Buick	9	2.10
0018	N	Lincoln	9	2.10
0019	N	Mercury	9	2.10
0020	N	Cadillac	8	1.87
0021	N	GMC	8	1.87

Univariate Nodes

Univariate drill down can be done by selecting column(s) from the density chart or by selecting percentiles from the table. In each method you get a row of nodes representing all possible values and those selected by you to further drill-down.

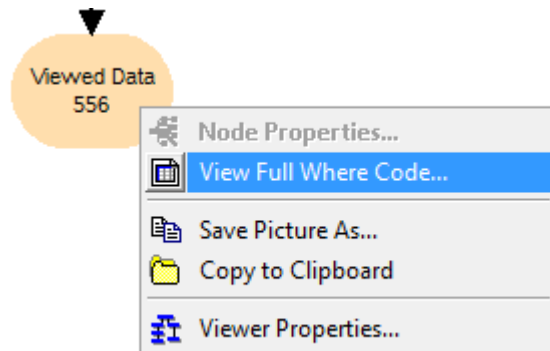


The example above shows a drill-down selection made on three out of eight columns presented in the density graph as shown in the following figure:



The Viewed Data Node

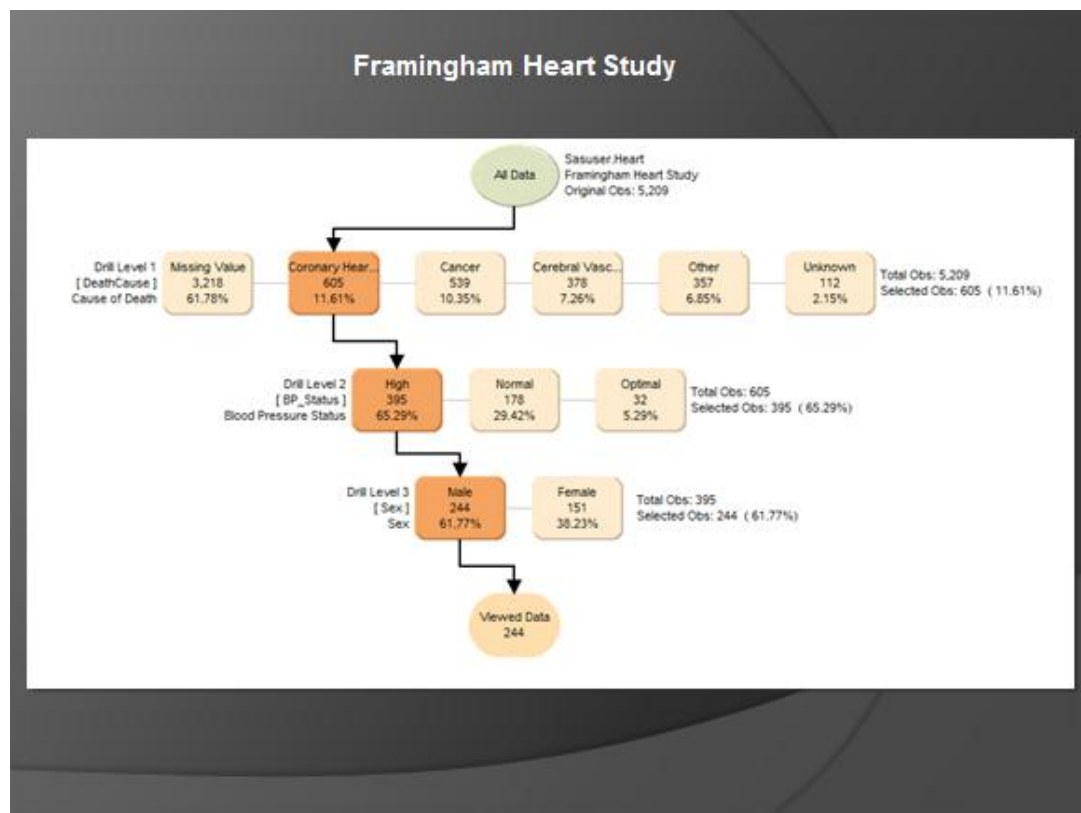
clicking on the "Viewed Data" node allow to select the option "View Full Where Code" which opens a window with all filters applied to this drill-down analysis: both the initial static one defined by the "Simple Filter" or by the "Advanced Filter" window and also the filters implied from the drill path.



From the window you can cut or save the complete code for future use by other SAS programs.

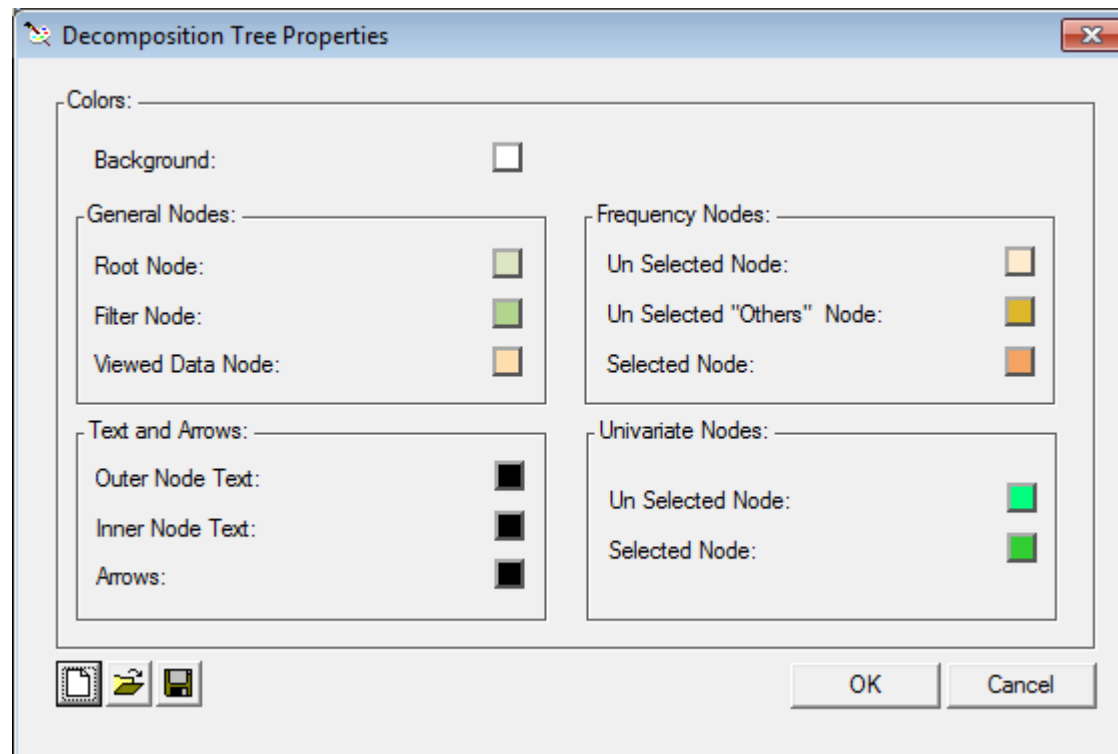
Saving and Printing the Decomposition tree

The graphic layout can be easily saved to a *.png file on your system or copied into Windows clipboard. These graphs are best suited for presentation for decision makers as shown in the following Power Point presentation example. Possible uses are analyzing campaigns, Risk portfolios, Customer segmentation etc.



Changing Attributes

Some default colors of the Decomposition Tree can be modified and saved for future use by selecting the "Viewer Attributes..." options of the pop menu as shown in the following figure:



Drill-Down Performance Tips

The performance of the drill-down mechanism in %Visual is dependent upon the following factors:

1. Number of observations and variables in the data set

Use data sets with the minimal required set of variables and observations. If possible, subset the data set prior to exploring its contents with %Visual Drill-Down mechanism.

2. Libname Engine

For data sets with millions of observations, SAS/Base SPDE engine will deliver better performance than the standard V9 Engine. Tip: Do not use compressed data sets. For large tables stored in External RDBMS accessed via SAS/Access engine, BiX Corp. recommends copying its contents to SAS SPDE data sets prior to exploring them with %Visual drill-down.

3. Physical Ram

Windows and Linux caches file blocks in memory. The first time you perform a drill-down on a data set it will take longer than consecutive drill-downs. Make sure your workstation or server is equipped with adequate amount of installed memory.

Real world example:

A Drill-down on a SAS V9 data set with 10M observations and 50 variables (a 5GB file) took (first time) 1:15 minutes and less than 2 seconds on consecutive drill-downs! (4 Core and 8 GB windows 7 Intel i7 box).

4. Disk Storage

Store your data sets on a modern disk array storage device which spreads the files amongst many disk drives and spindles.

Consider using RAM disk software or SSD drive to store your most frequently used data sets as well as the SASWORK libname path.

5. CPU/Cores

Use as many cpu/cores as possible since SAS and %Visual are multi-threaded.

For more detailed discussion of SAS tuning tips please refer to SAS documentation.

Clear All Drill-Downs

Clearing all drill-downs will close all drill-down windows selected along the drill path and will automatically return you to your SAS window. Alternatively, you can close each drill-down window and return one step back in the drill path.

Statistical Info

Overview

Single Numeric Variable

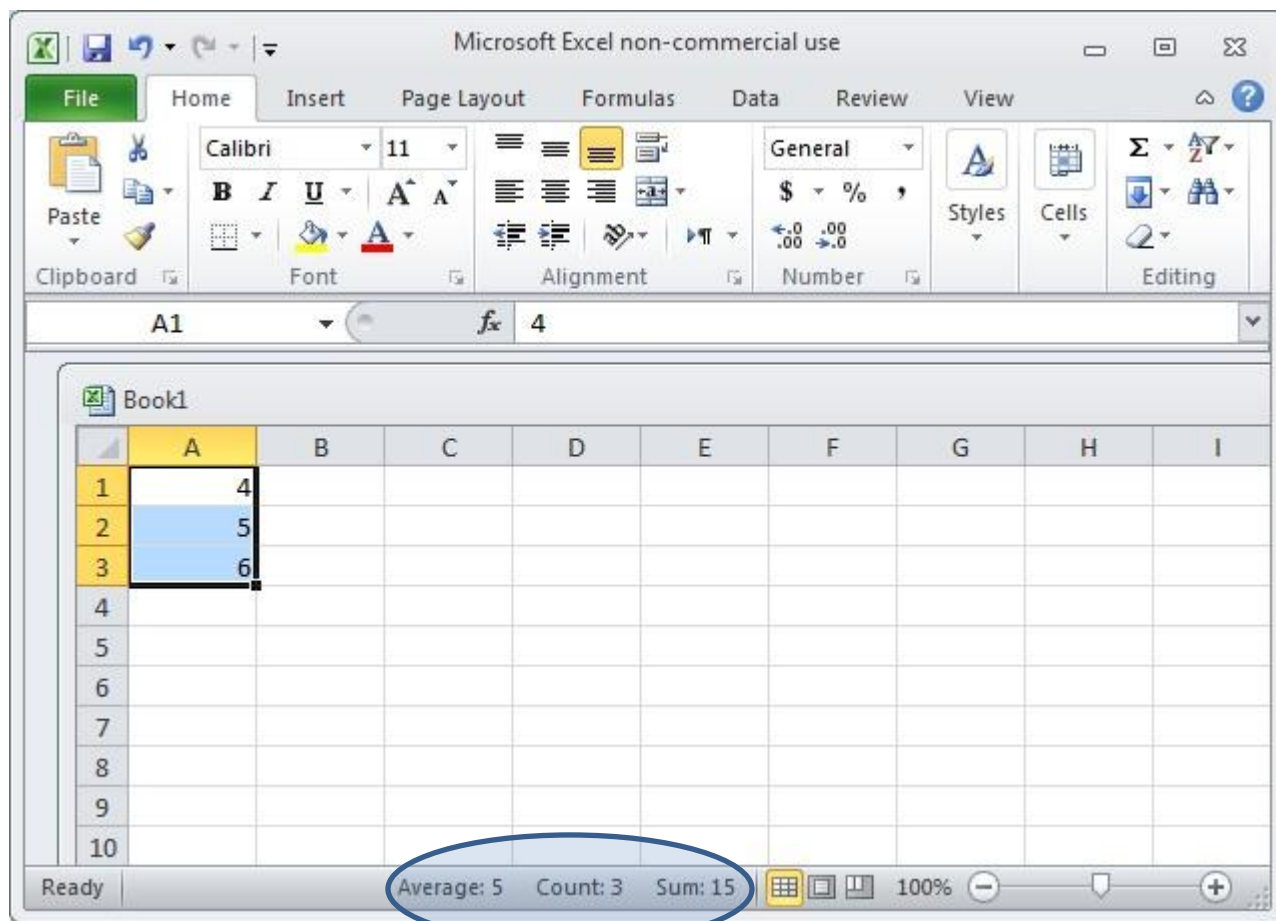
Single Char Variable

Single Data Variable

Multiple Variable Selection

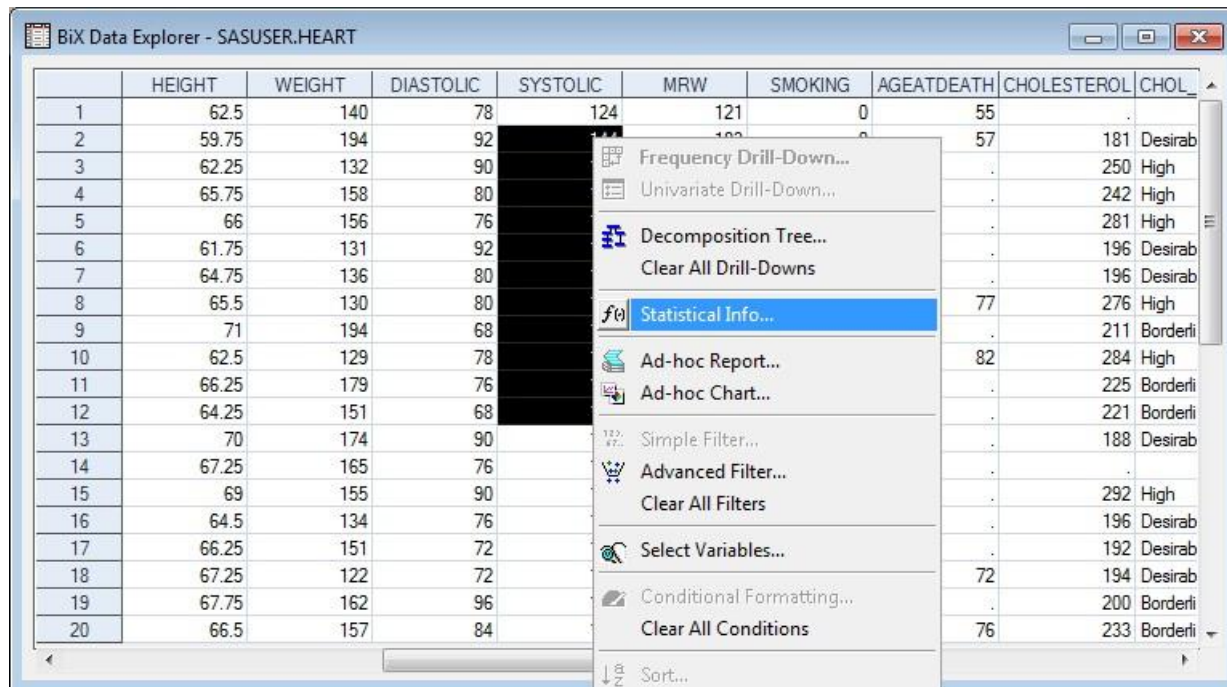
Overview

The statistical Info utility calculates statistics “on the fly” for the selected data block. It works in a similar way to MS Excel while selecting a rectangle containing cells as displayed in the following figure:



Single Numeric Variable

Highlight a block of data as displayed in the following figure and then open the pop menu. Select the “Statistical Info...” option.



For a single numeric list of values (either full or partial column) %Visual displays the following statistical info:

 [Systolic] Systolic
Non-Missing Values = 11
Missing Values = 0
Total Observations = 11
Unique Values = 10
Mode Value = 128.00
Sum = 1,446.00
Mean = 131.45
Std = 23.24
Median = 128.00
Maximum = 176.00
Minimum = 108.00

Single Char Variable

If the column is character then statistical info is limited as displayed in the following figure:

BiX Data Explorer - SASUSER.HEART

	SYSTOLIC	MRW	SMOKING	AGEATDEATH	CHOLESTEROL	CHOL_STATUS
1	124	121	0	55	.	.
2	144	183	0	57	181	Desirable
3	170	114	10	.	250	High
4	128	123	0	.	242	High
5	110	116	20	.	281	High
6	176	117	0	.	196	Desirable
7	112	110	15	.	196	Desirable
8	114	99	0	77	276	High
9	132	124	0	.	211	Borderline
10	124	106	5	82	284	High
11	128	133	30	.	225	Borderline
12	108	118	0	.	221	Borderline
13	142	114	0	.	188	Desirable
14	128	118	15	.	.	.
15	130	105	30	.	292	High
16	120	108	10	.	196	Desirable
17	132	112	30	.	192	Desirable
18	120	87	15	72	194	Desirable
19	138	119	1	.	200	Borderline
20	142	116	30	76	233	Borderline

[Chol_Status] Cholesterol Sta

- Non-Missing Values = 5,057
- Missing Values = 152
- Total Observations = 5,209
- Unique Values = 4
- Mode Value = Not Exist

Single Date Variable

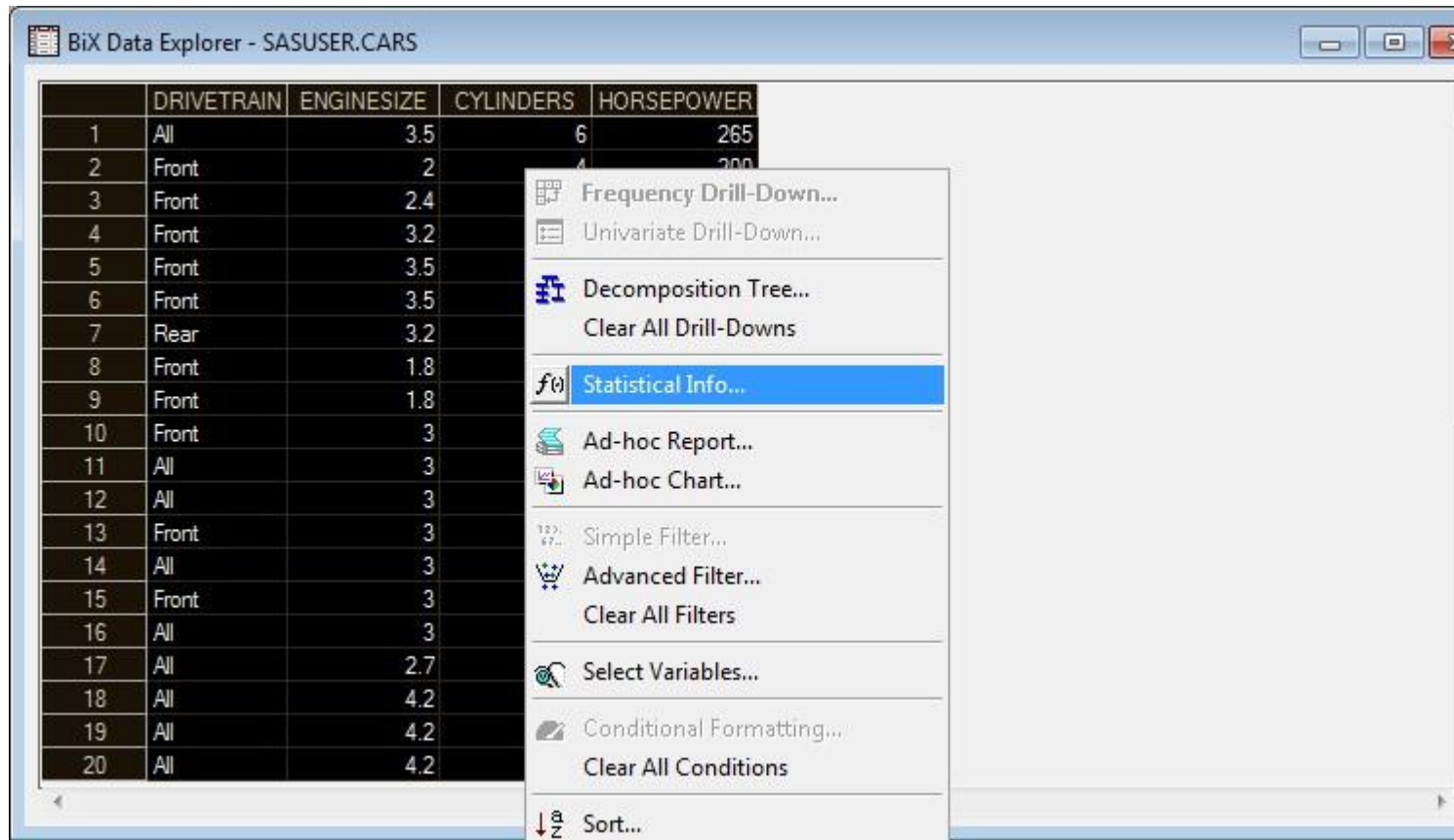
For a Date formatted variable the statistics contains the following calculated items:

[TAR_KBLA]

- Non-Missing Values = 78,773
- Missing Values = 0
- Total Observations = 78,773
- Unique Values = 565
- Mode Value = 14/12/2010
- Maximum = 01/09/2011
- Minimum = 01/01/2010

Multiple Variables Selection

A rectangle of data can also be selected for statistical info as displayed in the following figure:



When selecting multiple variables, %Visual calculates and shows a combination of statistical analysis derived from SAS PROC FREQ and PROM MEANS as displayed in the following figure:

Frequency Analysis

No. Observations Selected : 14
No. Unique Values : 7

	Count	Drive Train	Engine Size (L)	Cylinders	Horsepower
1	4	All	3	6	220
2	3	Front	3	6	220
3	2	Front	1.8	4	170
4	2	Front	3.5	6	225
5	1	Front	2.4	4	200
6	1	Front	3.2	6	270
7	1	Rear	3.2	6	290
8	Totals				
9	Sum:		40.4	78	3090
10	Mean:		2.89	5.57	220.71
11	Min:		1.8	4	170
12	Max:		3.5	6	290

You can print the contents of the above window into %Visual document management system using the pop menu.

Ad Hoc Reports

Overview

Save as Document

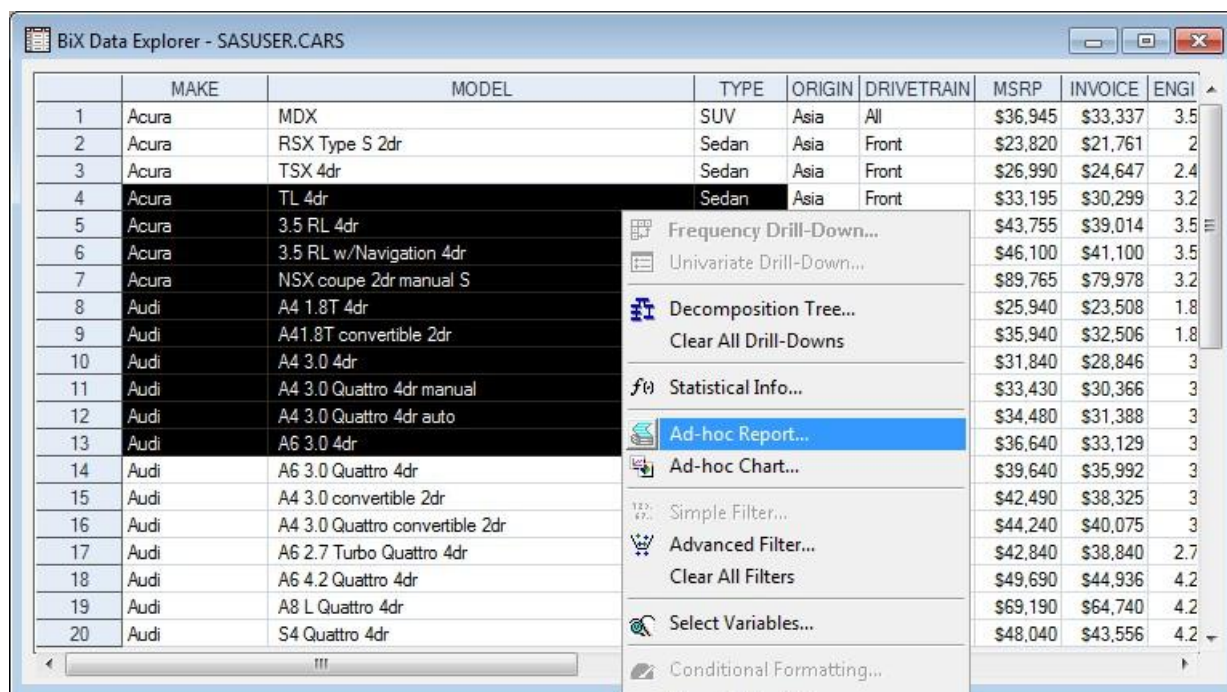
setting Style

Auto Copying Documents

Changes for Unix/Linux sites

Overview

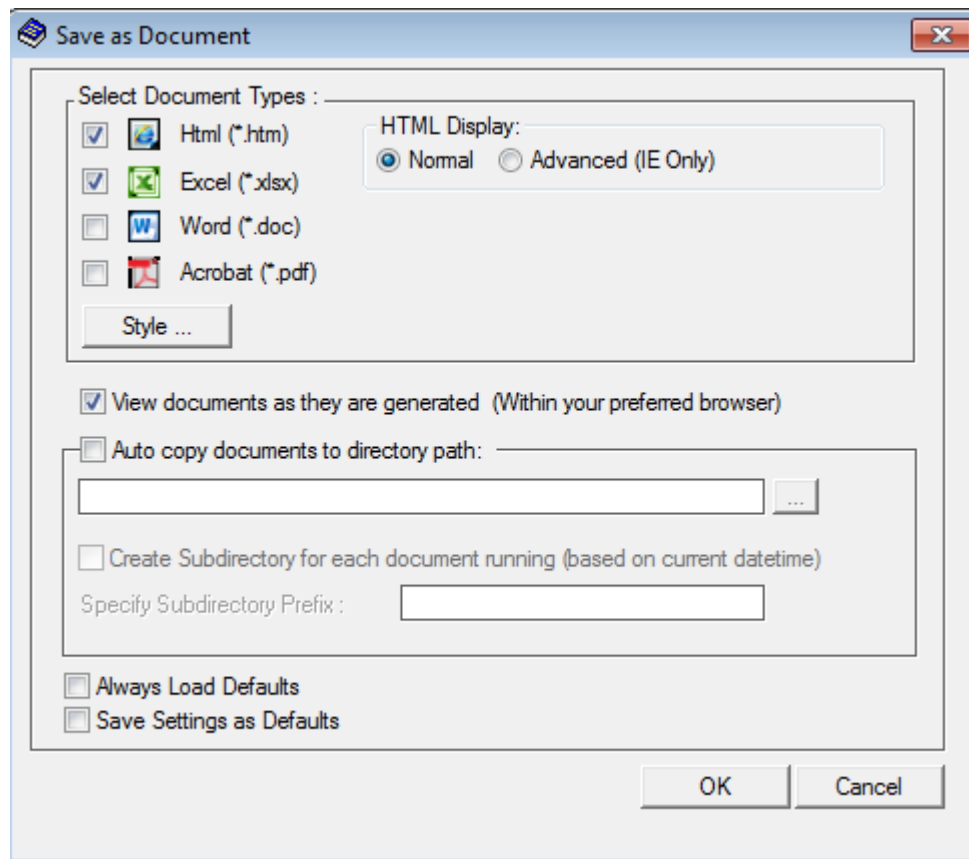
You can select (highlight) any region in a "%Visual Viewer" window (using one of the selection methods) and then select the "Ad-hoc Report..." option from the pop menu as displayed in the following figure:



All variables and observations included in the highlighted region will be available for the report. If you need to previously subset or sort the data, you can set a Filter using the "Simple Filter" and/or the "Advanced Filter" windows and select columns using the "Select Variable..." window.

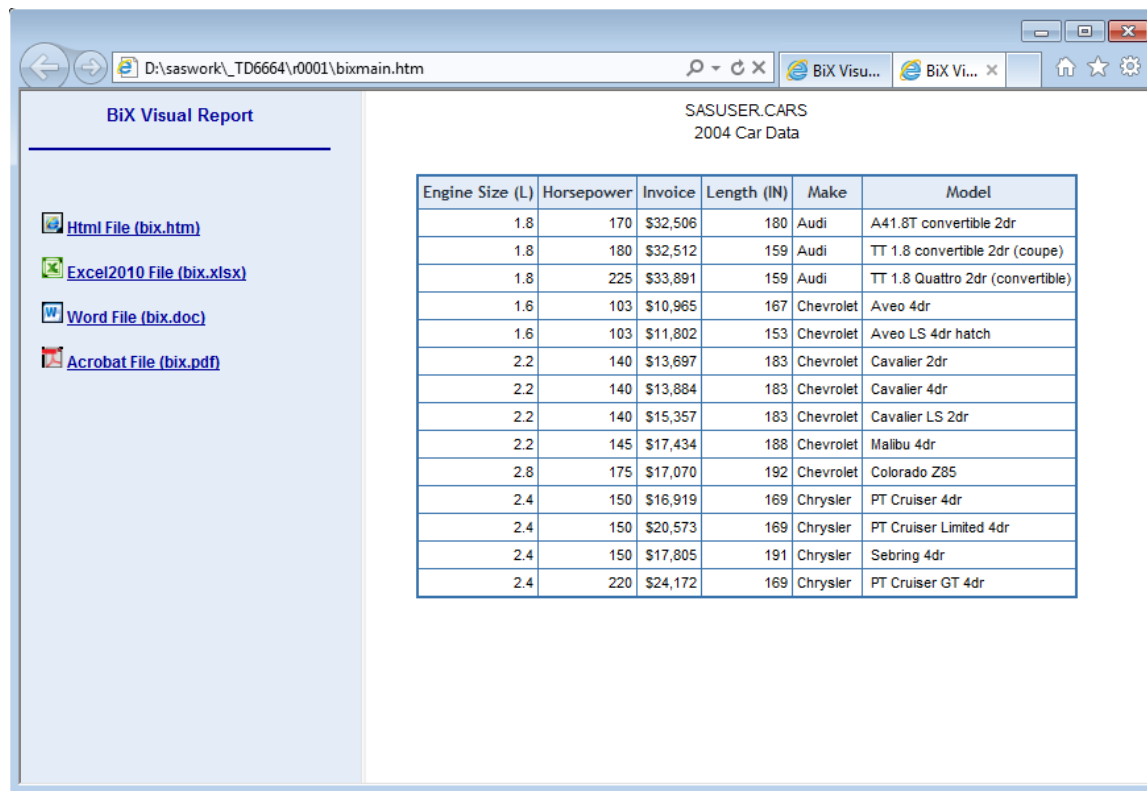
Save as Document

%Visual Document management system can create documents from several simultaneous formats:



HTML -	Will always be created (even if you don't check it)
Excel -	Excel 2010 true *.xlsx file
Word-	RTF document
Acrobat -	PDF document

The output will be displayed in your preferred browser with a contents left side bar:

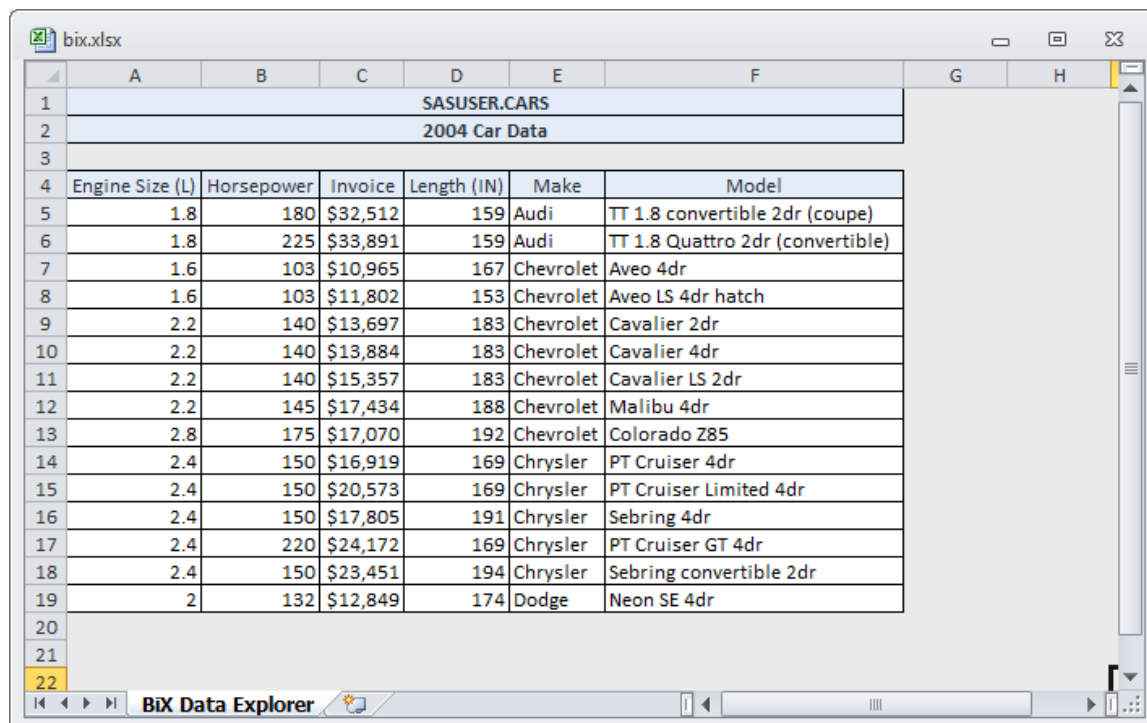


BiX Visual Report

SASUSER.CARS
2004 Car Data

Engine Size (L)	Horsepower	Invoice	Length (IN)	Make	Model
1.8	170	\$32,506	180	Audi	A41.8T convertible 2dr
1.8	180	\$32,512	159	Audi	TT 1.8 convertible 2dr (coupe)
1.8	225	\$33,891	159	Audi	TT 1.8 Quattro 2dr (convertible)
1.6	103	\$10,965	167	Chevrolet	Aveo 4dr
1.6	103	\$11,802	153	Chevrolet	Aveo LS 4dr hatch
2.2	140	\$13,697	183	Chevrolet	Cavalier 2dr
2.2	140	\$13,884	183	Chevrolet	Cavalier 4dr
2.2	140	\$15,357	183	Chevrolet	Cavalier LS 2dr
2.2	145	\$17,434	188	Chevrolet	Malibu 4dr
2.8	175	\$17,070	192	Chevrolet	Colorado Z85
2.4	150	\$16,919	169	Chrysler	PT Cruiser 4dr
2.4	150	\$20,573	169	Chrysler	PT Cruiser Limited 4dr
2.4	150	\$17,805	191	Chrysler	Sebring 4dr
2.4	220	\$24,172	169	Chrysler	PT Cruiser GT 4dr

The Excel file will look like:



bix.xlsx

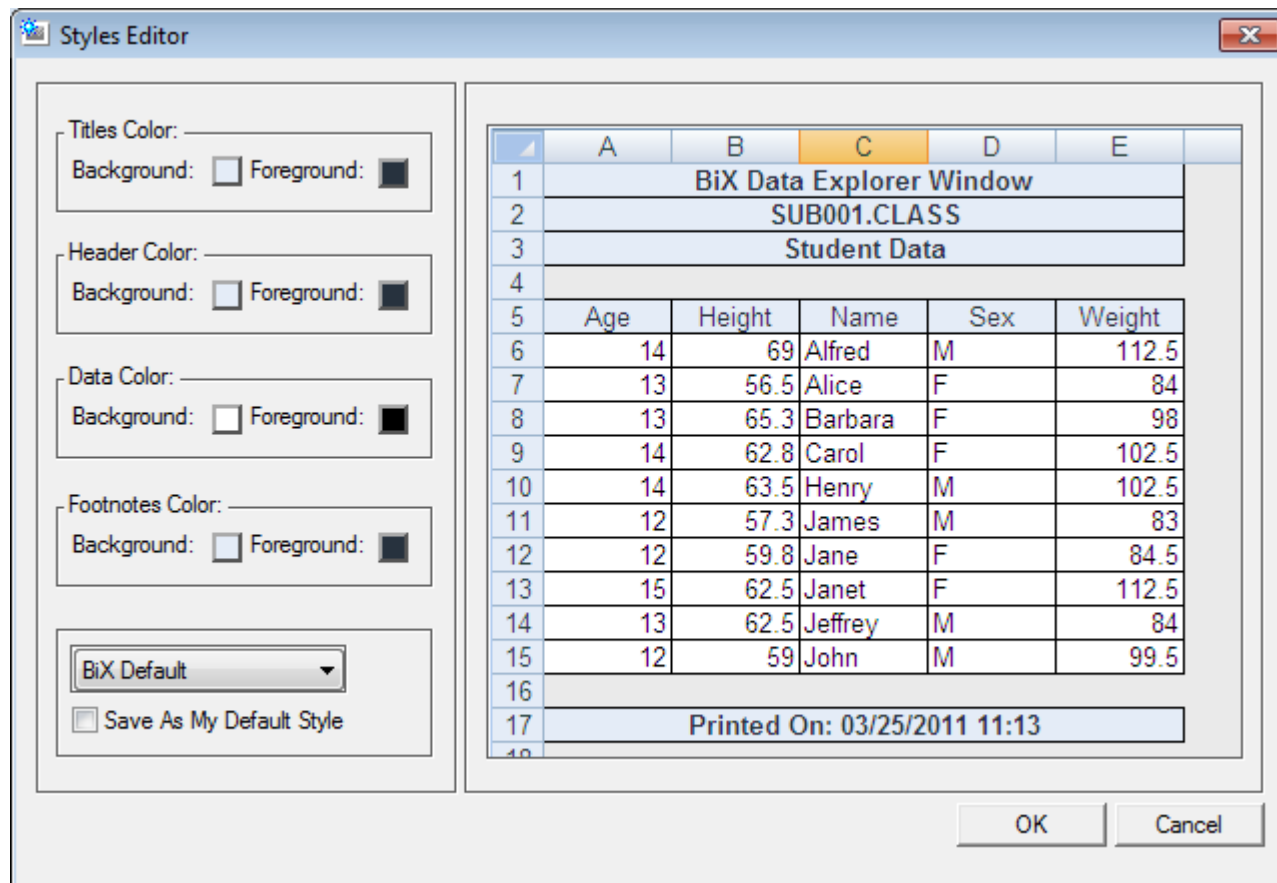
	A	B	C	D	E	F	G	H
1	SASUSER.CARS							
2	2004 Car Data							
3								
4	Engine Size (L)	Horsepower	Invoice	Length (IN)	Make	Model		
5	1.8	180	\$32,512	159	Audi	TT 1.8 convertible 2dr (coupe)		
6	1.8	225	\$33,891	159	Audi	TT 1.8 Quattro 2dr (convertible)		
7	1.6	103	\$10,965	167	Chevrolet	Aveo 4dr		
8	1.6	103	\$11,802	153	Chevrolet	Aveo LS 4dr hatch		
9	2.2	140	\$13,697	183	Chevrolet	Cavalier 2dr		
10	2.2	140	\$13,884	183	Chevrolet	Cavalier 4dr		
11	2.2	140	\$15,357	183	Chevrolet	Cavalier LS 2dr		
12	2.2	145	\$17,434	188	Chevrolet	Malibu 4dr		
13	2.8	175	\$17,070	192	Chevrolet	Colorado Z85		
14	2.4	150	\$16,919	169	Chrysler	PT Cruiser 4dr		
15	2.4	150	\$20,573	169	Chrysler	PT Cruiser Limited 4dr		
16	2.4	150	\$17,805	191	Chrysler	Sebring 4dr		
17	2.4	220	\$24,172	169	Chrysler	PT Cruiser GT 4dr		
18	2.4	150	\$23,451	194	Chrysler	Sebring convertible 2dr		
19	2	132	\$12,849	174	Dodge	Neon SE 4dr		
20								
21								
22								

BiX Data Explorer

And all other file formats will be opened in their respective application.

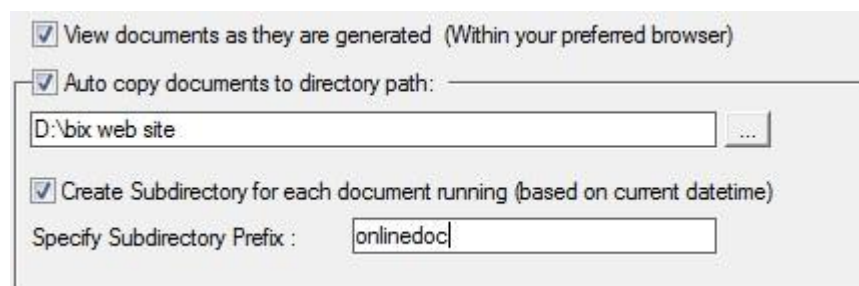
Setting Style

%Visual Styles affects the output created for Excel, HTML, PDF and Word documents. %Visual has a set of 5 predefined styles and an additional set of 5 personal styles which can be customized. The "Styles Editor" window shows on the right side a preview of the style. You can only change colors for the 5 personal styles.



Auto Copying Documents

%Visual temporarily stores the documents in a subdirectory created under the SASWORK Libname. You can set %Visual to automatically copy the documents to a permanent directory in your system. (This directory can also be mounted to your web server, thus immediately updating the information stored within a web portal)

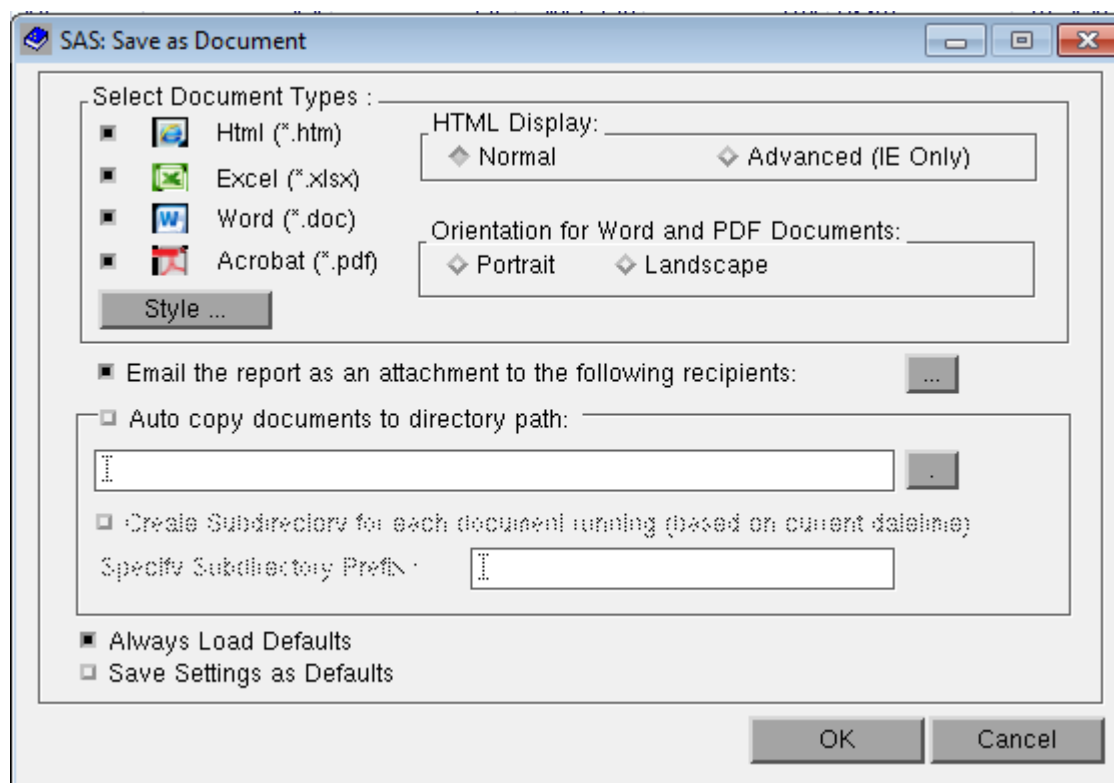


Each submission of a report creates a set of files (HTML files, xlsx files, gif files etc.) and all of these files are stored in a directory that can be prefixed with a string defined in the above window.

Changes for Unix/Linux sites:

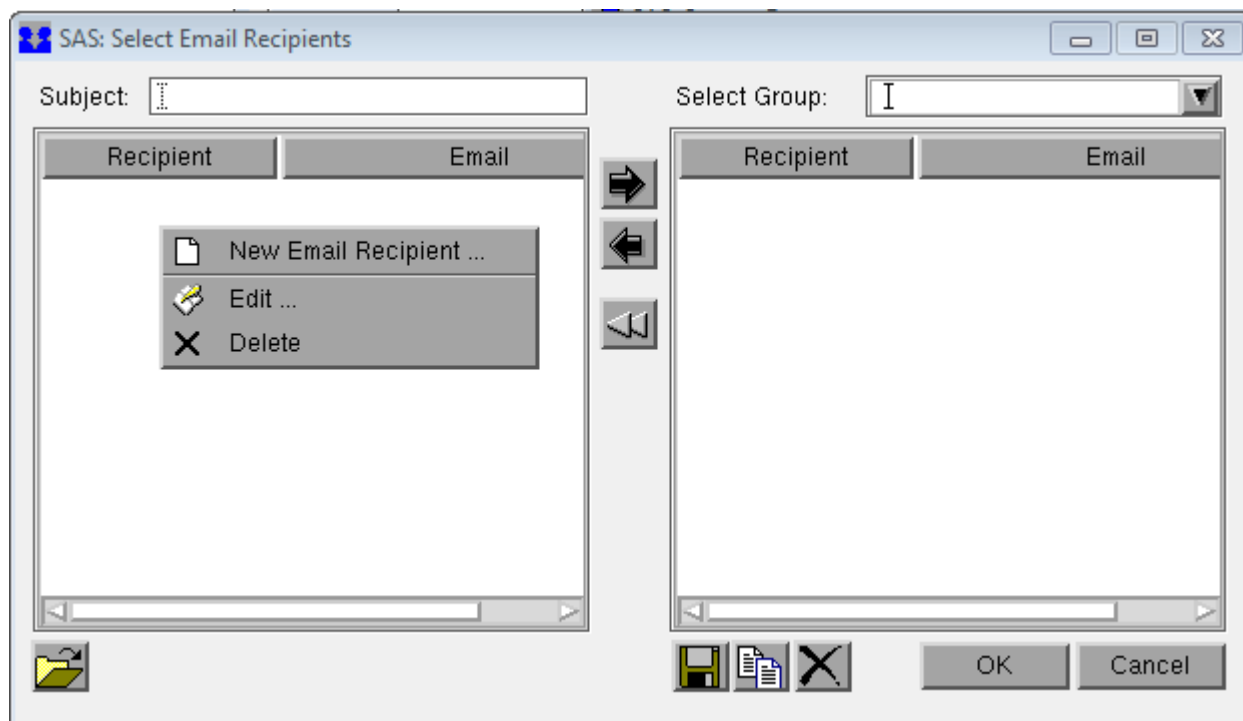
When running %VISUAL in a Unix/Linux environment, usually you will not be able to launch your preferred internet browser from your SAS session. The GUI for these systems offers a way to automatically send the documents to your preferred list of email addresses (which your own email address can be one of them) and then open the document from your email box.

If your site has a shared file system between the Unix/Linux box and the Windows server (by means of physically sharing which several hardware vendors can offer or by means of software installation like Samba), then you can also use the second method of copying the documents to your selected folder on the Windows server.

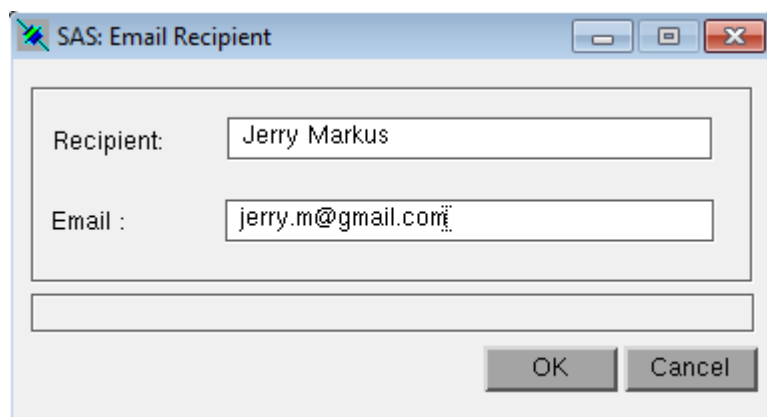


After the completion of the reports you'll be presented with a confirmation window that tells you where your reports were sent to. (You can use both methods simultaneously).

To select Email recipients, check the option as displayed in the above figure and then push the ... pushbutton. You'll be presented with the following window:



On the left side of the window you can view all your email recipients. To add an email recipient, right click the mouse and select “New Email Recipient...” option. Fill the details in the small window as displayed in the following figure:



You can also import your recipients from a SAS data set with the following characteristics:

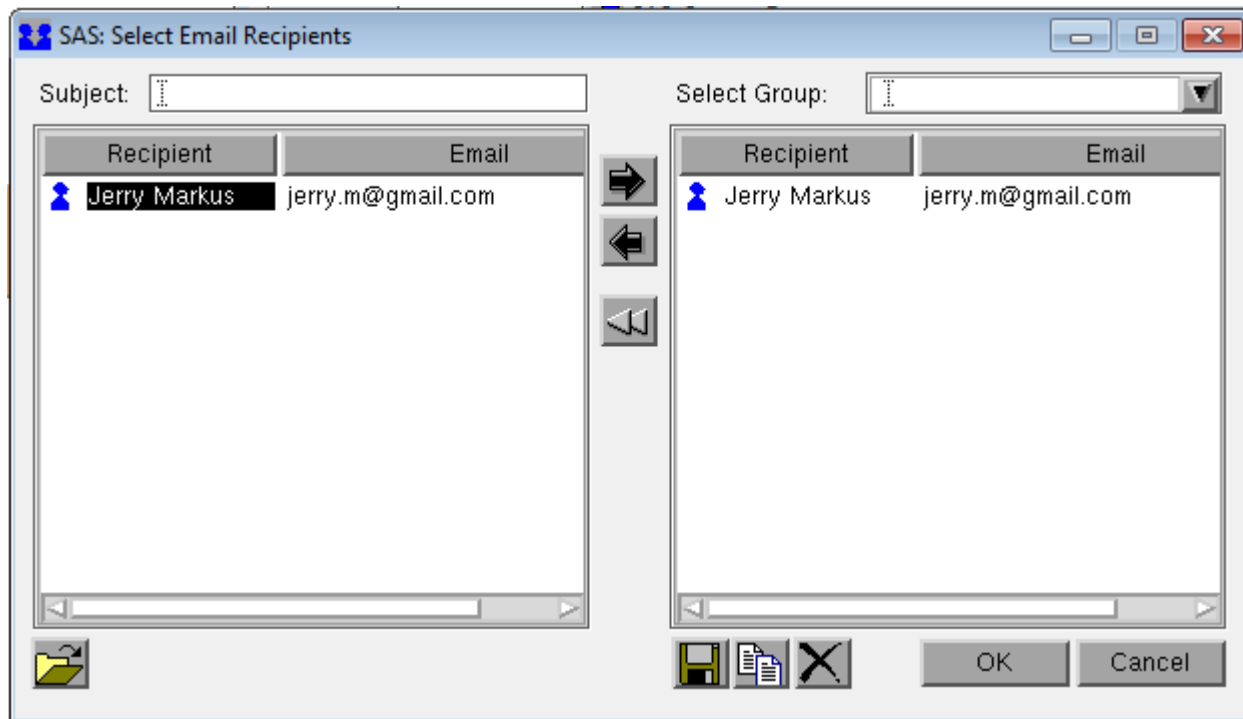
Data set name must be: “SASUSER.RECIPIENTS”

A character variable named “recipient” with length of 50.

A character variable named “email” with length of 256.

Tip: you can export your common email connections from your email application and import it with a simple SAS program into a data set with the same characteristics as needed by %visual.

After inserting or importing your email recipients, you can select any one of them (or more) to form a group of recipients. The group can be saved under a name of your choice and be reused for future reports.



Upon running the report, all Email recipients will receive an Email message with the report attached as a Zip file. Extracting the Zip file will create all the underlying files that creates the report (Html files, Gif files and all other file formats selected for the report).

Ad Hoc Charts

Overview

Graphics Output

- PIE Chart & Donut Chart
- BAR Charts (All types)
- 2D PLOT Chart
- 3D Surface Chart
- BarLine Chart
- Map Chart
- KPI Chart

Titles Window

Style Window

- Selecting Style for the Graph
- Selecting Style for Excel

Appearance Window

- The General Tab
- The Images Tab
- The Axis Tab
- The Lines Tab
- The Legend Tab
- The Grid Tab

Advanced Window

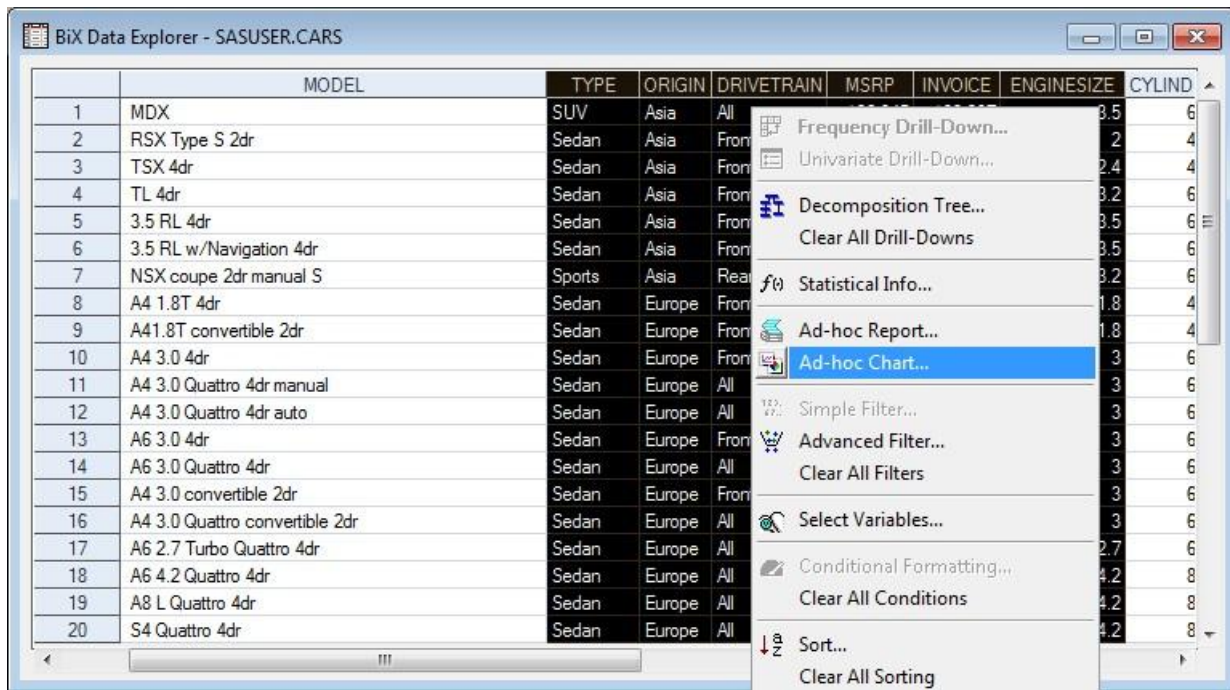
- The Pie/Donut Tab
- The Bar Tab
- The 2D Plot Tab
- The 3D Surface Tab
- The Barline Tab
- The Map Tab
- The KPI Tab

Additional Topics

- Save Picture to File
- Copy Picture To Clipboard
- Save Picture as Document
- Graphics with Multiple Pages

Overview

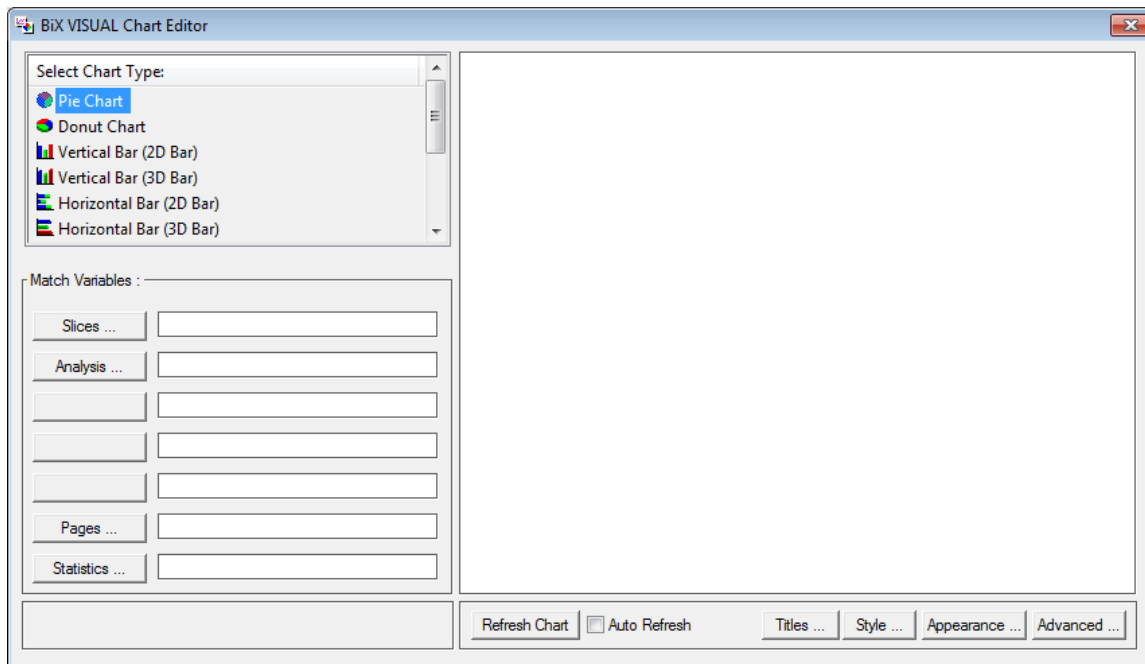
%Visual supports many of SAS software business charts. To draw a chart, select an area in "%Visual Viewer" window according to one of the selections methods described earlier. Then, from the pop menu select "*Ad Hoc Charts...*" options as described in the following figure:



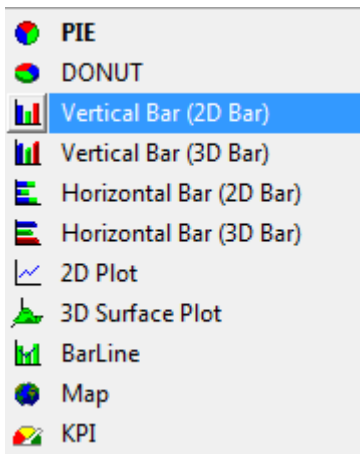
Note1: If columns are not in a contiguous block, you can use the "Select Variables..." or "Move Columns..." options to arrange columns in the desired order.

Note2: Maximum number of selected variables cannot exceeds 20.

"Visual Chart Editor" window will be displayed as in the following figure:



"%Visual chart editor" supports many chart types common for business graphics:



Matching Variables

After selecting the chart type that best suit your needs, you must assign "roles" to the selected variable that were included within the highlighted block of data. The "Match Variable" section of the window will display labels on push buttons according to the selected type of chart. In the following example, the push buttons are displaying options for a Pie Chart and for a Bar Chart as an examples:

Match Variables :

Slices	
Analysis	
Pages	
Statistics	

Matching Options for a Pie Chart

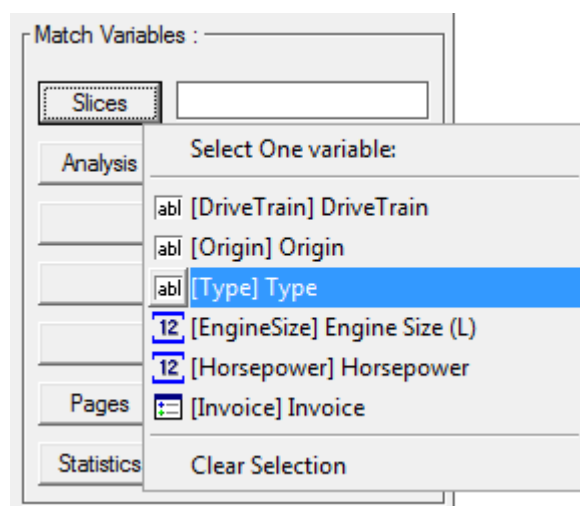
Match Variables :

MidPoints	
Analysis 1	
Analysis 2	
Groups	
SubGroups	
Pages	
Statistics	

Matching Options for a Bar Chart

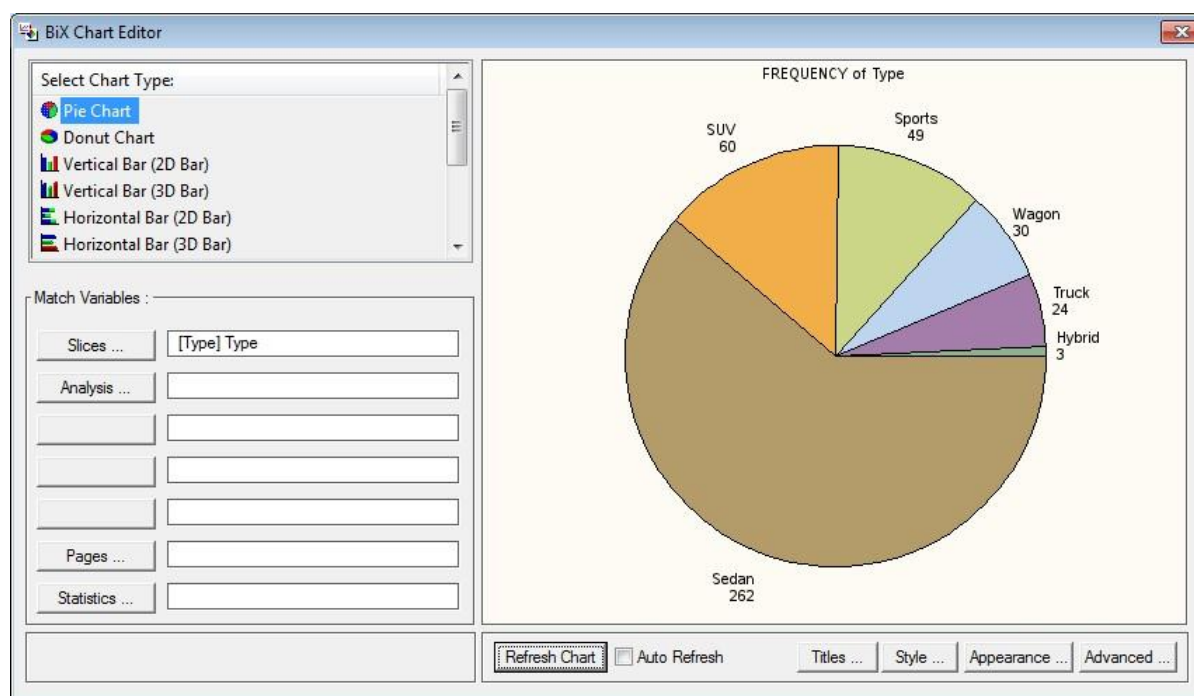
Some of the push buttons are mandatory and some are optional. For example, the "Pages..." push button is always optional.

For a Pie Chart, select the "Slices..." push button. A pop menu with all available variables will let you select the appropriate one for the chart:



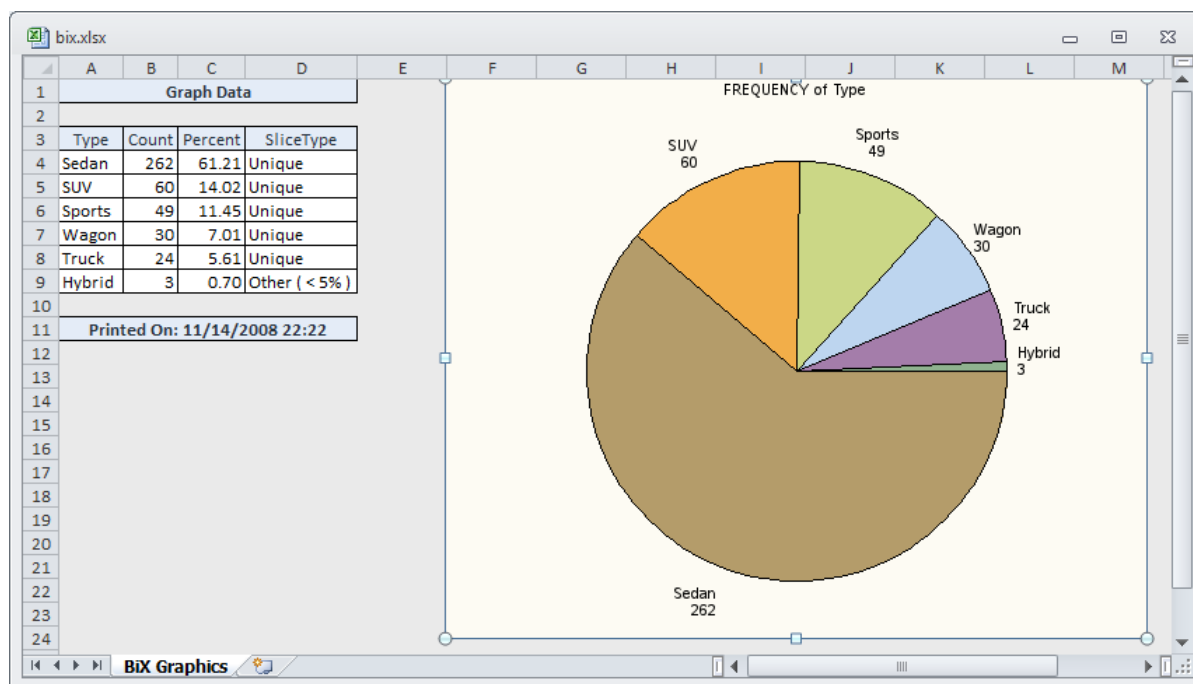
Click the "Refresh Chart" push button at the bottom of the following figure:

Your chart will be immediately(*) displayed in the window as in the following figure:



(*) On first time, SAS initialize the graphic module so it may take a while until the chart will be produced.

A numerous options within sub-windows lets you change and control every aspect of the chart. %Visual is designed to quickly produce a default chart just by selecting the chart type and matching the mandatory variables. You can also immediately print the chart to many types of documents or copy it to Windows clipboard to be later pasted into any Windows compatible application. The following figure display the chart saved as an Excel2010 document. As you can see, the spreadsheet created by %Visual contains both the chart and the table of the data used to create the chart.

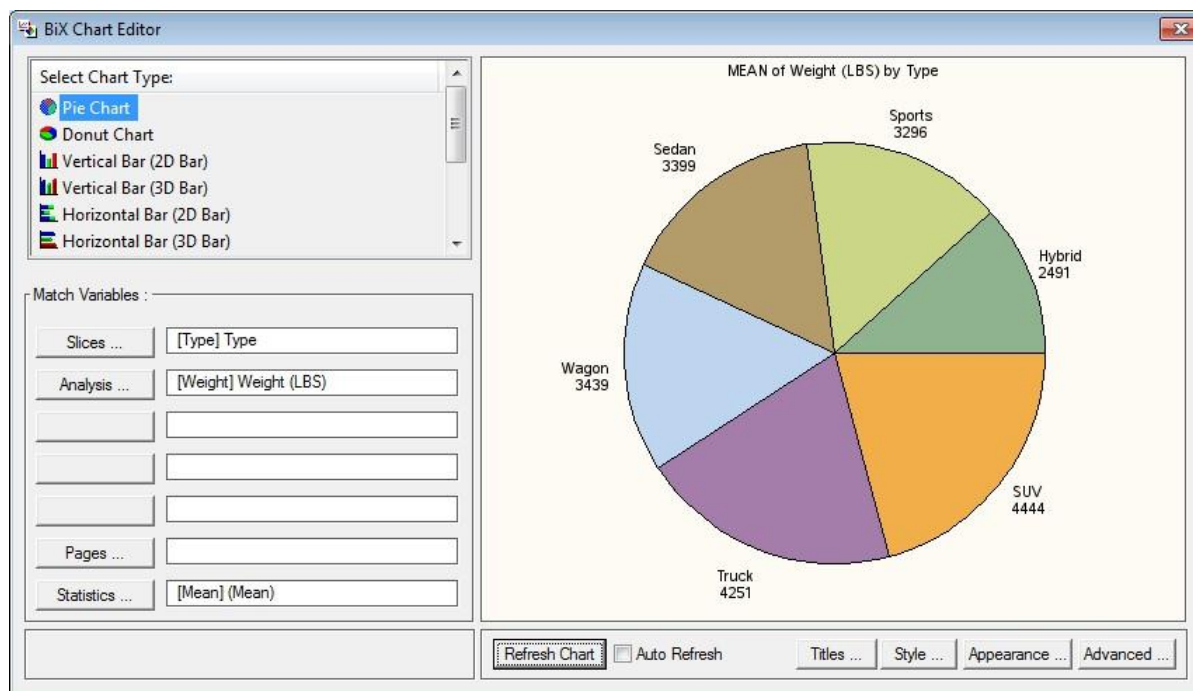


Graphics Output

The following section will describe the matching variables needed by every type of chart in order to produce the initial default chart:

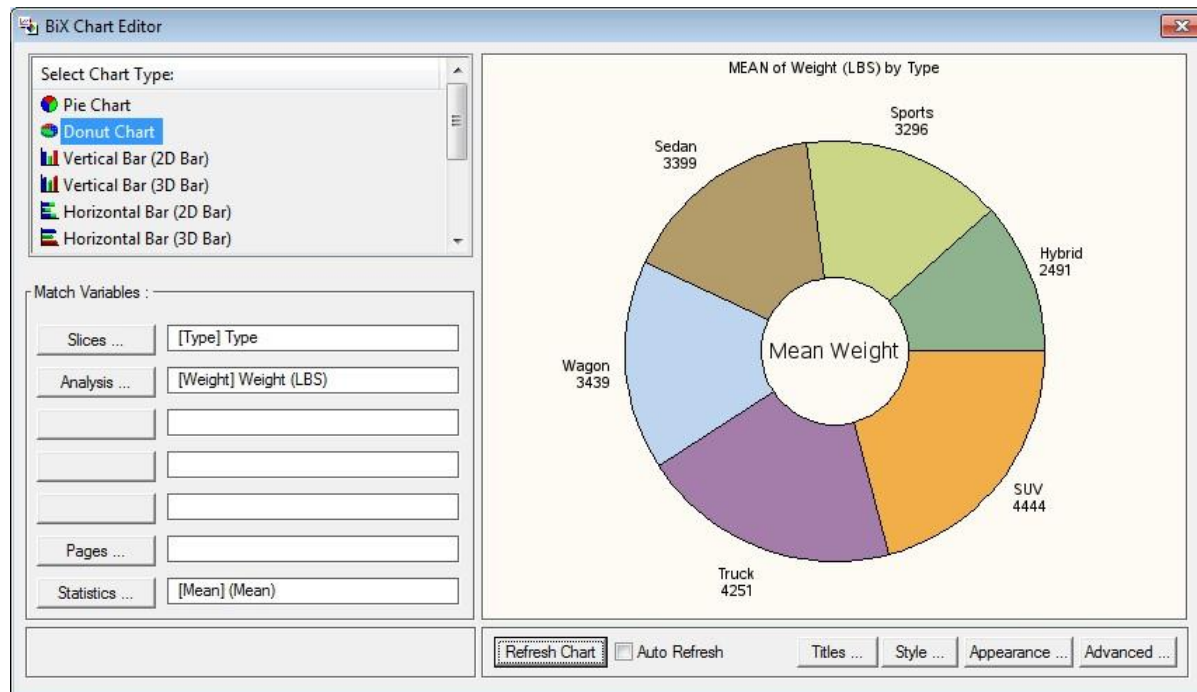
Pie Chart & Donut Chart

For the "slices" push button you should select a variable with distinct values (either numeric or character). The values of this variable will determine the slices of the pie chart. In many cases, this variable will have a user defined format associated with. If the variable has many distinct values, then all values contributing less than 5% will be automatically grouped together into "Other" slice. (This 5% threshold can be modified).



If no analysis variable was selected, then the size of each slice represents the number of observations in each slice (frequency). In this case the "Statistics" push button is optional. If you select an Analysis variable (Must be a numeric one), then you must also select a Statistics (Sum or Mean). The size of each slice then represents the statistics calculated for each slice as displayed in the example above where each slice represents the mean value of "Weight" of cars for every type of car. By default, slices are ordered clockwise from the largest to the smallest one. (the first slice starts at angle 90). One can see in the example above that the group of "SUV" cars is having the largest mean weight while "Hybrid" cars group is having the smallest mean weight.

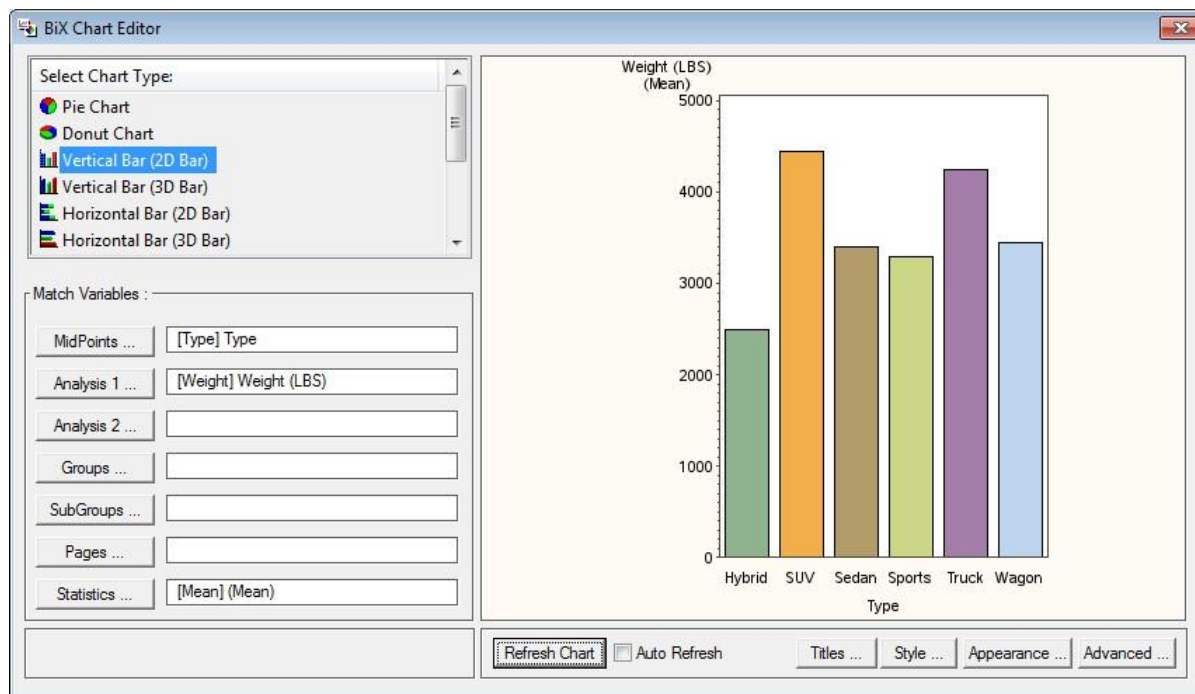
Donut charts have the same characteristics as Pie charts except the extra "Hole" in the middle. Text can be inserted into this hole and also its relative diameter can be set using advance options of %Visual.



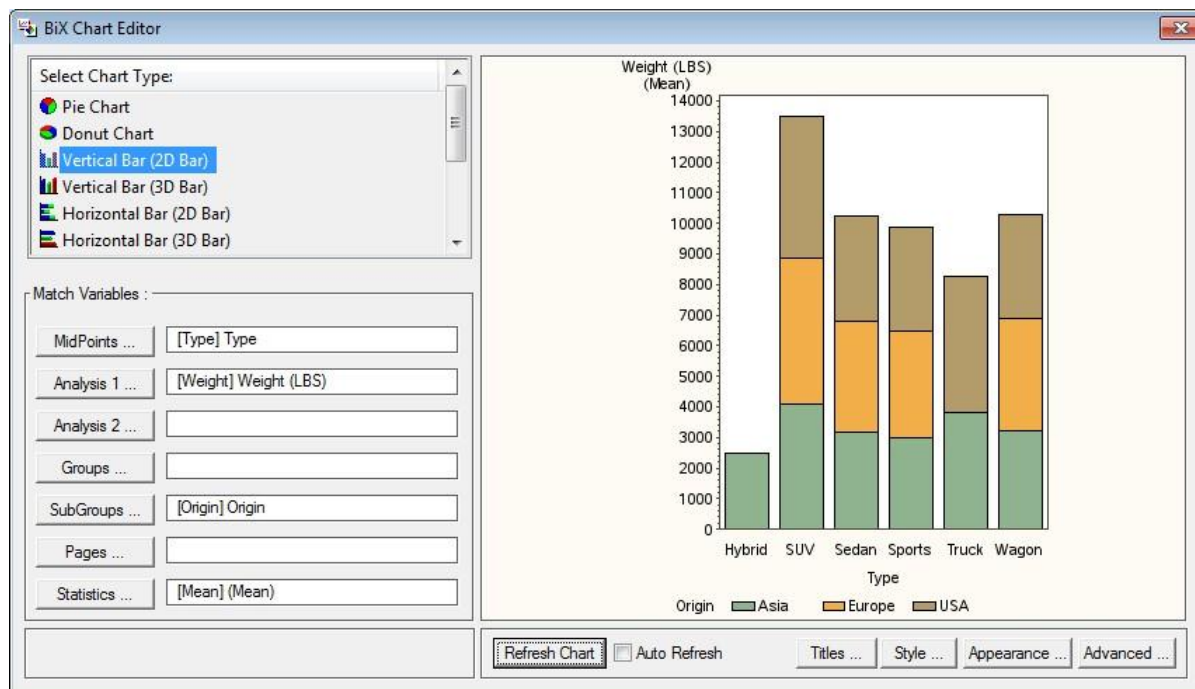
Data source: sashelp.cars

Bar Charts (All Types)

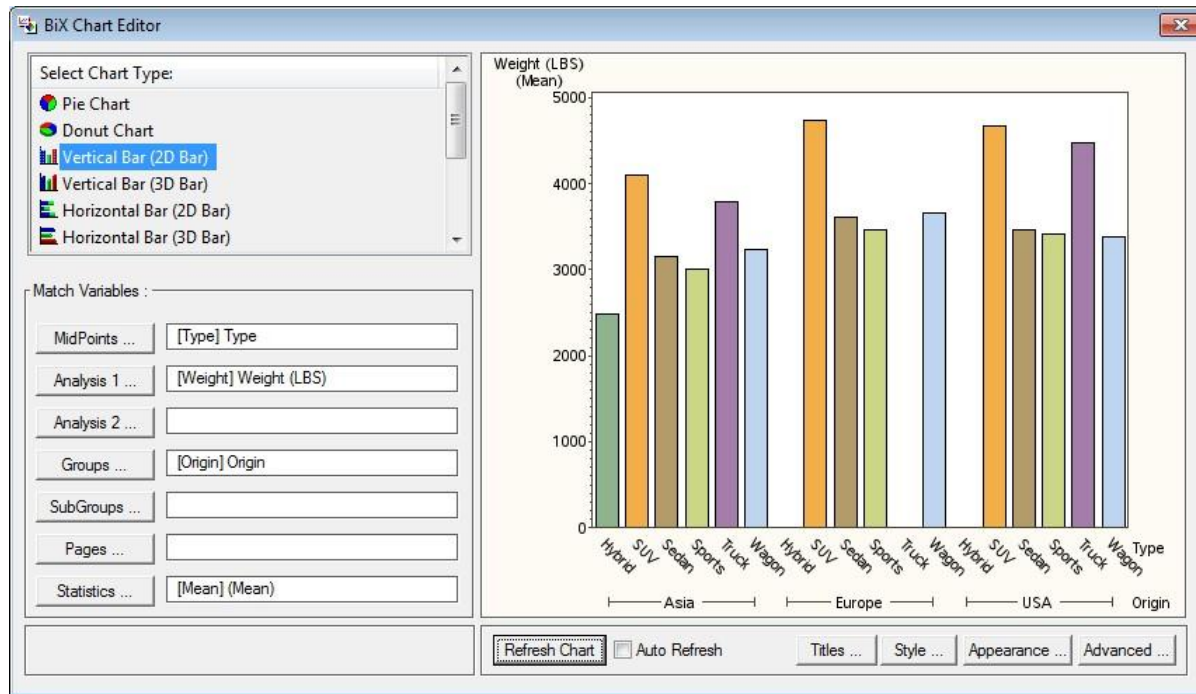
%Visual can generate numerous types of bar charts: vertical or horizontal and plane or 3D shaded bar charts. The minimum requirement for a bar chart is the "MidPoint" variable which is a numeric or character variable which usually have a set of distinct values. MidPoints can be either on the horizontal axis or the vertical axis. If you only select a "MidPoint" variable then the size of the bar can only represent the frequency (Same behavior as the "Slices" in pie and donut charts). If, on the other hand, you will select an "Analysis" variable, (which must be a numeric one) then the size (height) of the bar represents the statistics computed on this variable for each bar. Bar charts does not have an automatic "Other" grouping of small values as pie and donut charts do. Thus, if you have a "MidPoint" variable with many distinct values you might get a cluttered display of many narrow bars.



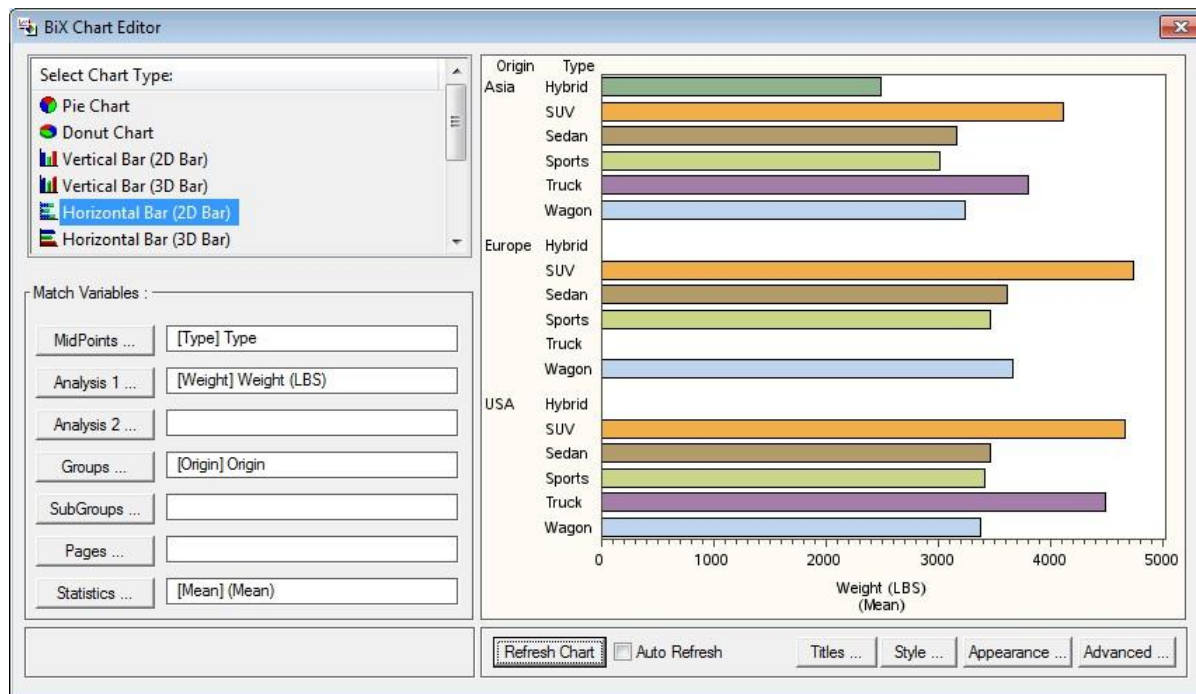
The "SubGroups" variable can divide each bar into sub-section displaying the relative contribution of each sub section to the total value of the bar. The "SubGroup" variable can be either numeric or character and usually has a set of distinct values. Whenever a SubGroup variable is selected, a Legend is automatically displayed inside the graph in order to properly match sub-sections with the specific color pattern.



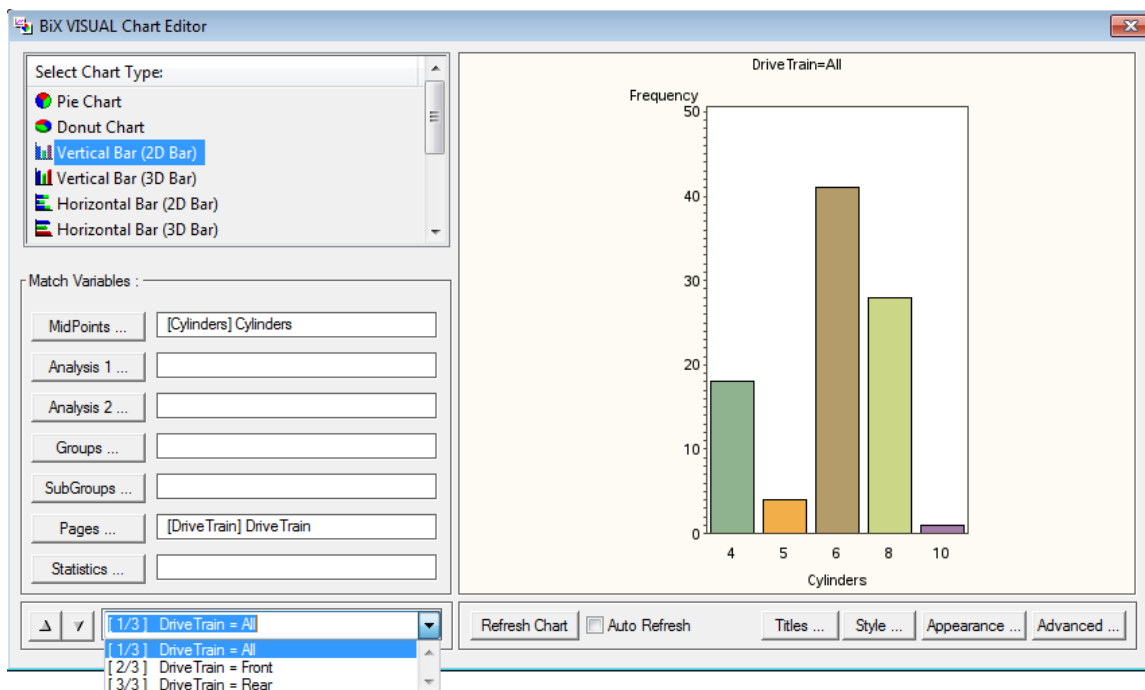
The "Groups" variable displays groups of bars based on distinct values as in the example below:



A second analysis variable can also be selected (In this case you cannot use the "Groups" push button). This technique is used to compare two analysis variables for each distinct value of the MidPoint variable as displayed in the following figure:



And finally, the "Pages" variable creates multiple charts for every distinct value of the "Pages..." variable. These multiple charts can be accessed through the "Next" or "Previous" push buttons located at the lower left side of the window. These push button are hidden if there is no selection for the "Pages...".

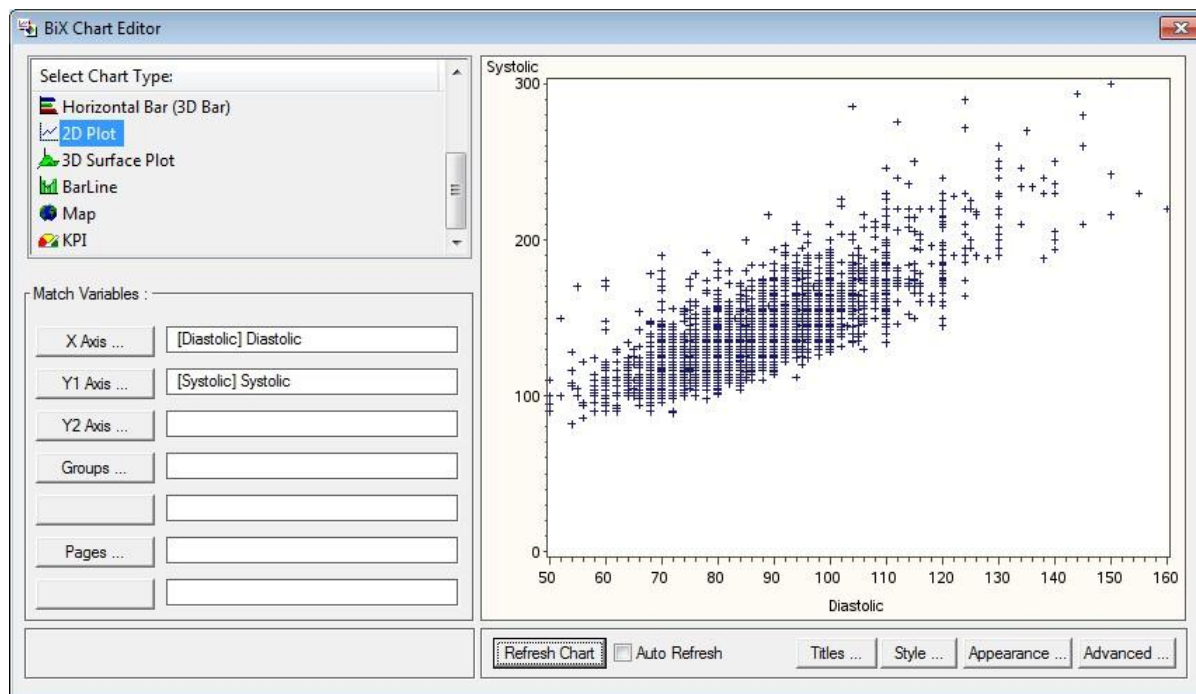


2D Plot Chart

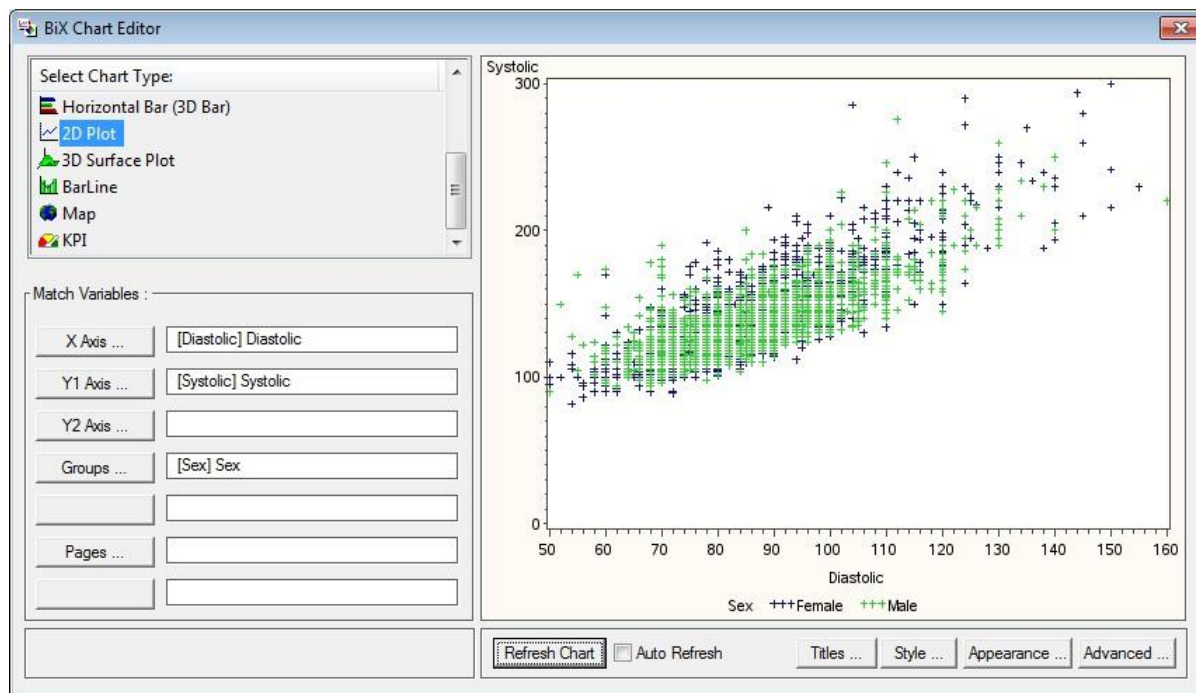
Plots are different from Pie or Bar charts since they don't make any previous calculations on data prior to displaying the data in a chart.

Note: Pie and Bar first summarize the data based on the values of Slice, MidPoint, Group or SubGroup categories and creates the chart according to these summarized values. You can think of Pie and Bar charts as if you would first invoke SAS PROC Means to create a summarized data set and only then a chart is drawn based upon these values. On the contrary, If you would have to chart these detailed values in Excel, then you would first had to create a "Pivot Table" and only then you could create the Excel chart.

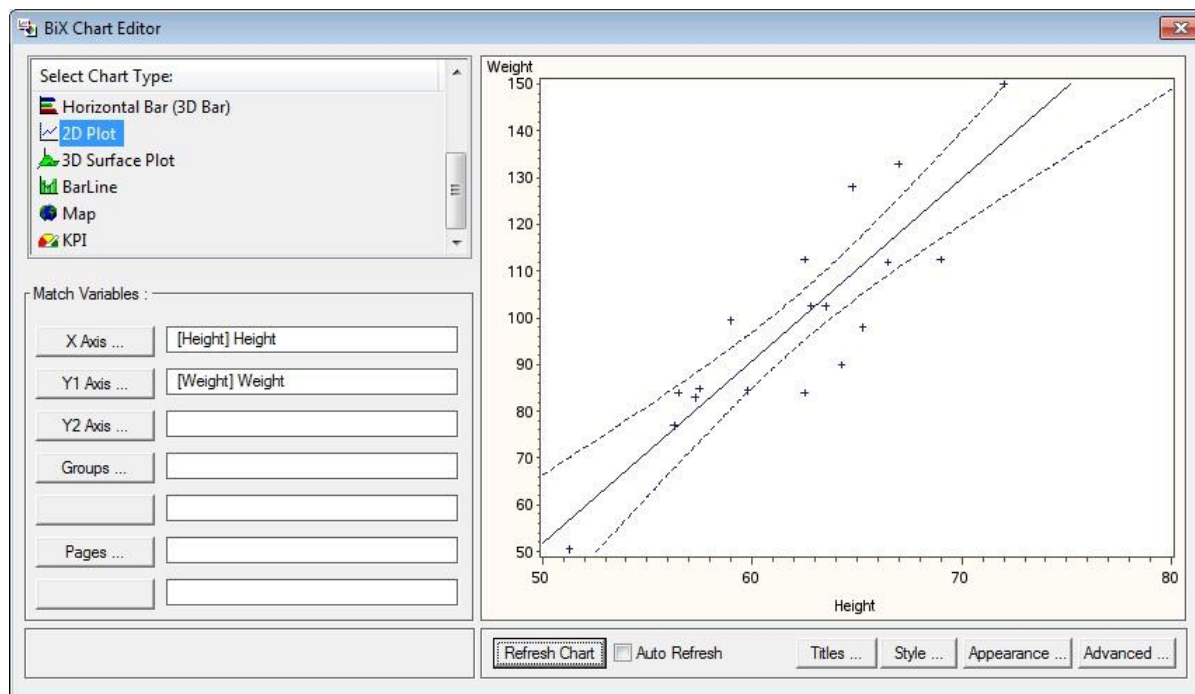
For a 2D plot chart, You need to supply two variables (numeric or character) for the "X Axis" and for the "Y Axis" push buttons. Each combination of these two variables values is displayed in the chart. No calculation is done on these values and they are all displayed as in the following example where 5,209 observations of sashelp.heart data set are displayed in the chart. This kind of chart is usually called "Scatter Plot". Scatter plot are mainly used to graphically view a possible correlation between two variables. The following example implies a linear correlation between "Systolic" and "Diastolic" blood pressure.



Using the "Groups..." variable one can see the scatter plot divided into several distinct groups. These groups are having different color and symbol as displayed in the following figure:

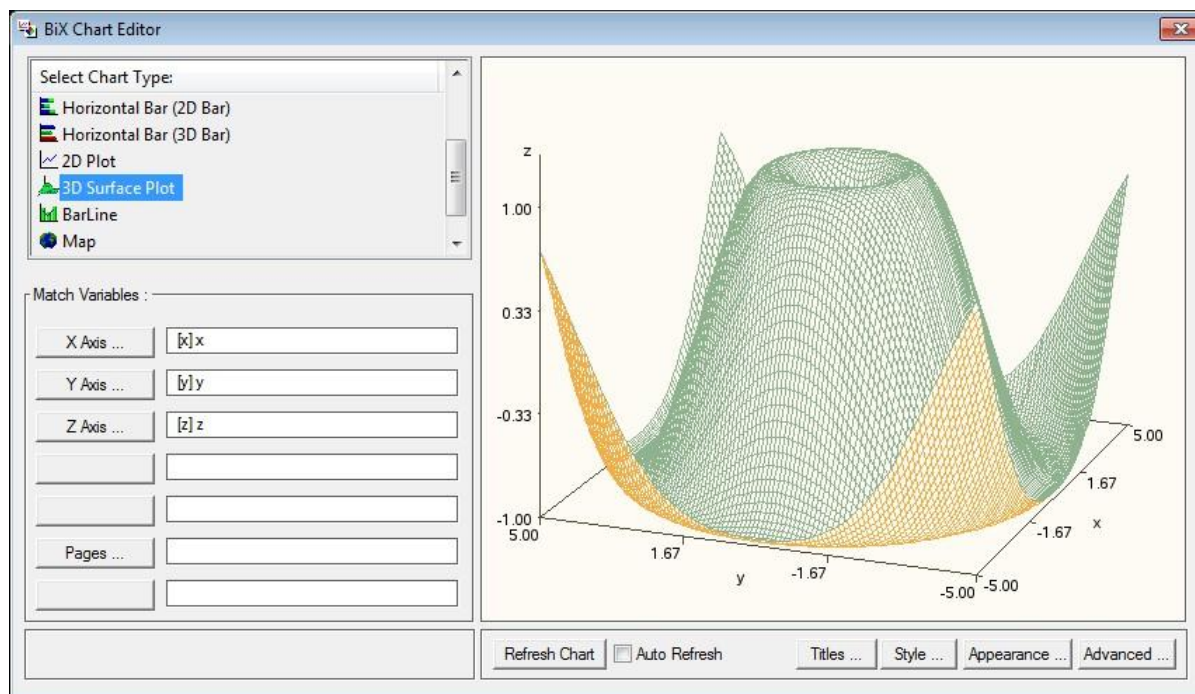


Using the "Advanced..." and "Appearance..." push buttons more sophisticated plots can be produced where dots can be connected with a line using several methods. In the following figure a "Regression" method was selected to draw a regression line between the dots of the chart.



3D Surface Chart

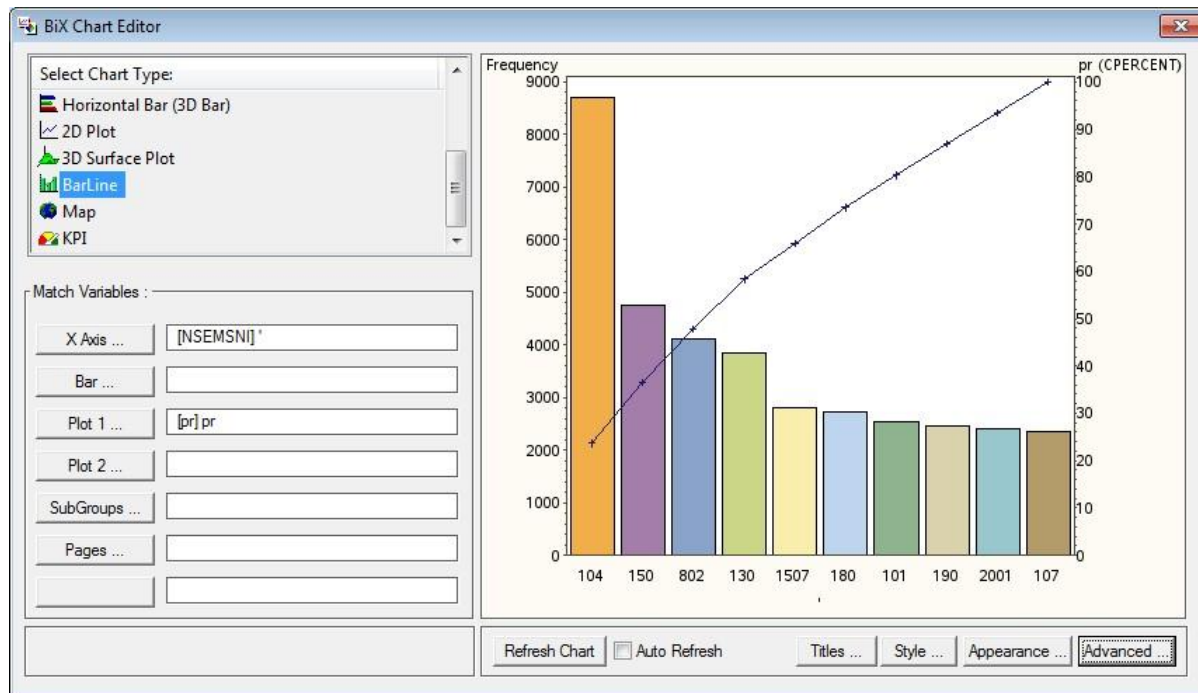
This is a 3 dimensional plot chart that plots Z values against a plane describes by (X,Y) coordinates. The Z values are connected to form a surface. You must supply three numeric variables for the X, Y and Z variables.



The above chart usually called "cowboy hat" describes a known mathematical formula $z = \sin(\sqrt{x^2 + y^2})$;

Barline Chart

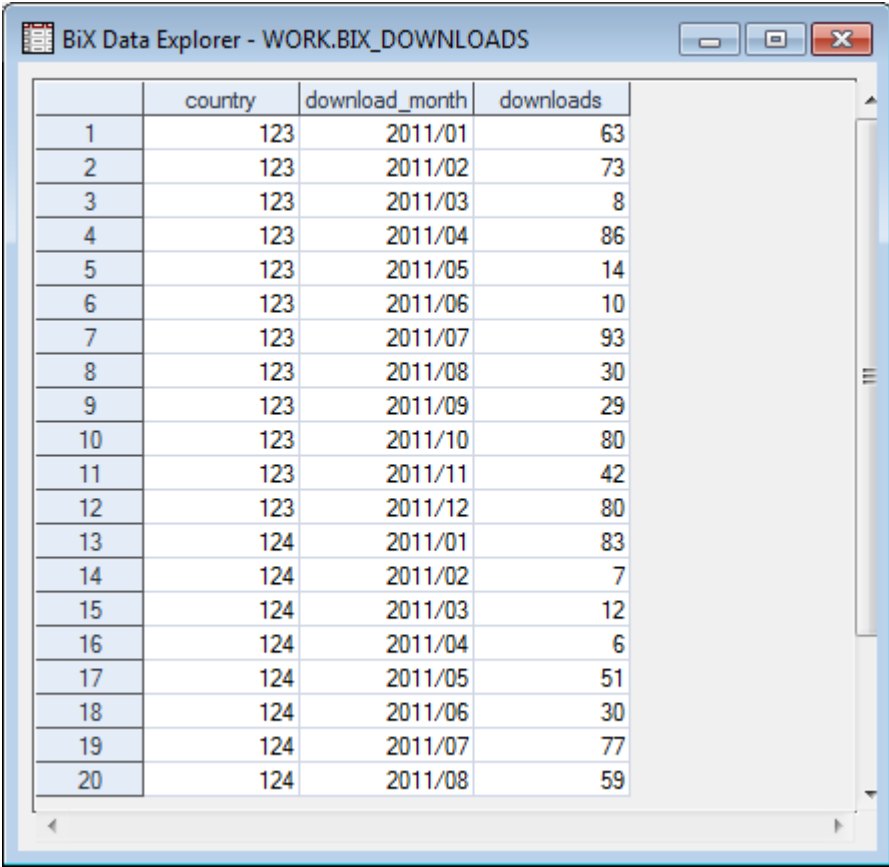
A combined chart of vertical bars and plot chart.



Map Chart

In order to chart a map you need to have two SAS data sets :

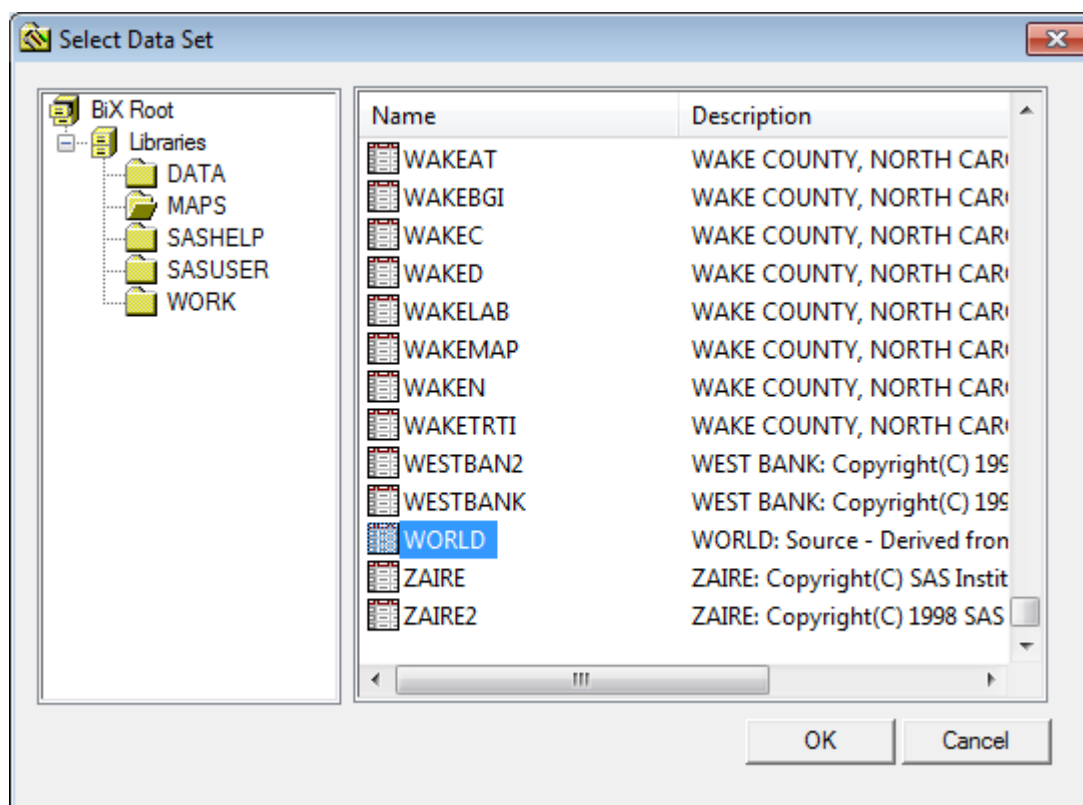
1. A map data set appropriate for your data. SAS supplied maps can be found at the MAPS Libname where hundreds of already made maps can be found as SAS data sets. Each data set contain an ID variable which identify the specific "Polygon" in the map. For example, in the "World" SAS data set the ID variable contains countries codes around the globe. Each country (or in more general terms, each polygon) is usually made of several observations describing the boundaries of polygons as lines with (x,y) coordinates.
2. A "data" data set which has a numeric variable with the same values as the values of the ID variable in the Map data set. This way you can "link" values in your data to polygons on the map. For example, your data may contains monthly downloads of %Visual software for each country over the globe. Your data may be looking something like this:



BiX Data Explorer - WORK.BIX_DOWNLOADS

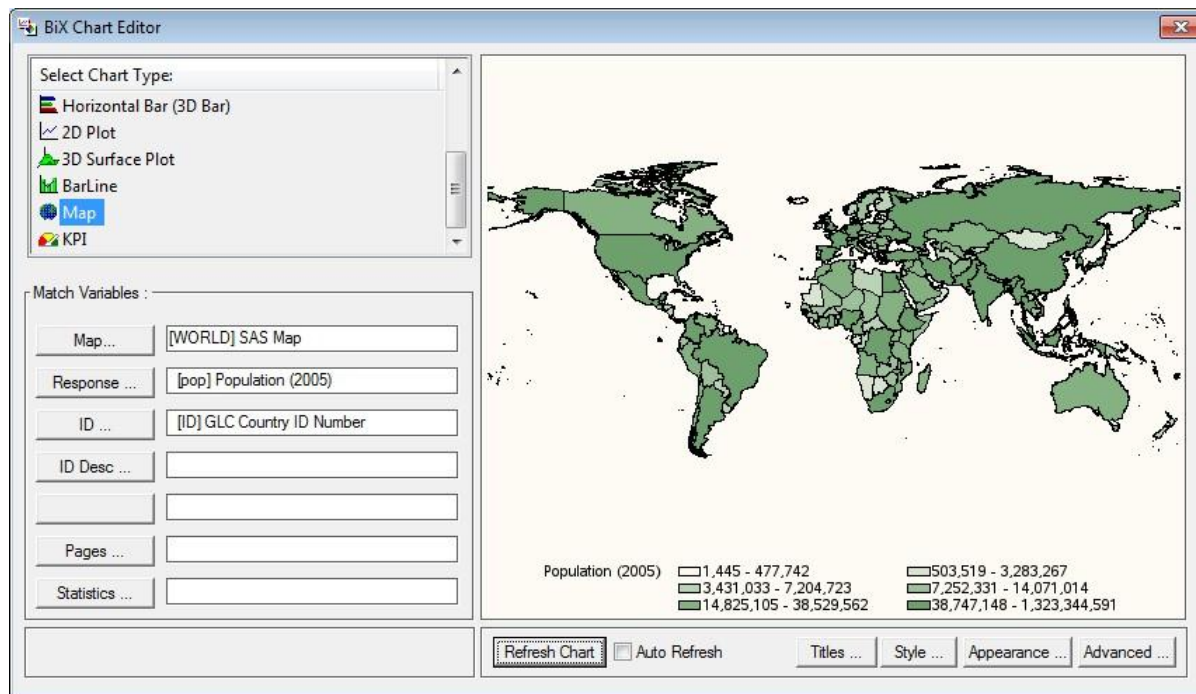
	country	download_month	downloads
1	123	2011/01	63
2	123	2011/02	73
3	123	2011/03	8
4	123	2011/04	86
5	123	2011/05	14
6	123	2011/06	10
7	123	2011/07	93
8	123	2011/08	30
9	123	2011/09	29
10	123	2011/10	80
11	123	2011/11	42
12	123	2011/12	80
13	124	2011/01	83
14	124	2011/02	7
15	124	2011/03	12
16	124	2011/04	6
17	124	2011/05	51
18	124	2011/06	30
19	124	2011/07	77
20	124	2011/08	59

In order to produce the map chart, select a "Map..." data set. A selection window will be opened to allow you to specify the Map data set as displayed in the following figure:



Then select the "Response..." variable from your block of selected variables from your data set. In the example above it would be "Downloads". Then select the ID variable to match the ID variable of the map data set. In the example above it would be "Country".

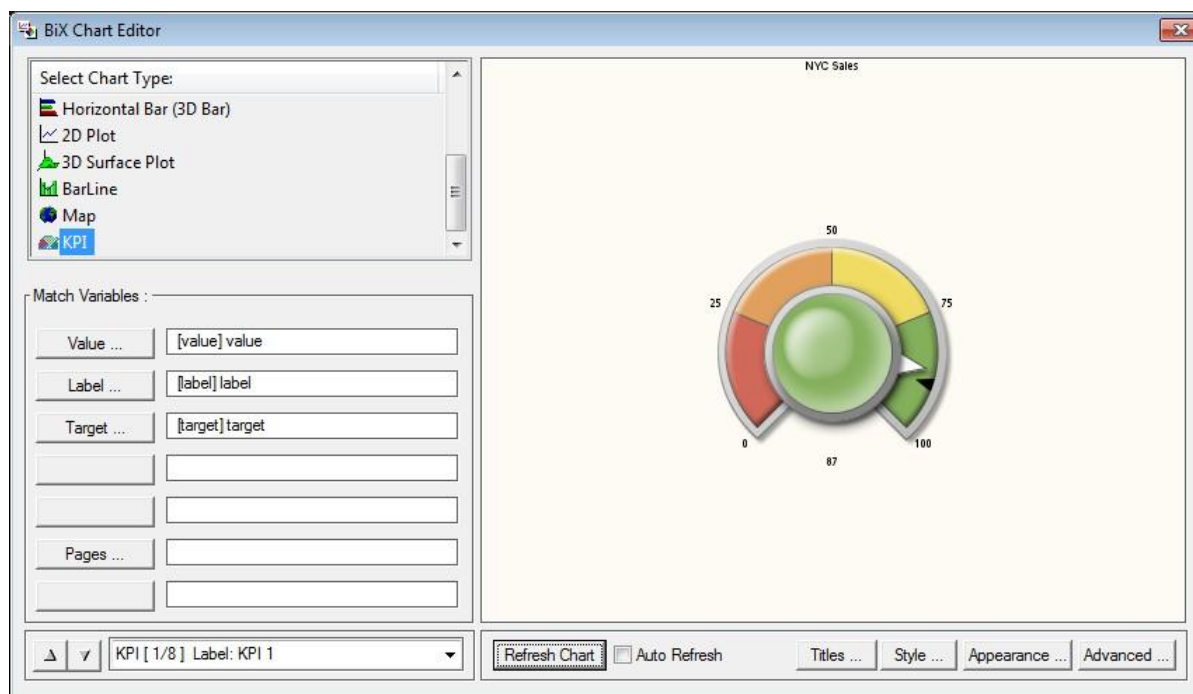
The "downloads" values will be summarized for each country and the total value will be used to specify the color of that country on the map. By default, each map has six levels of colors and polygons on the map gets their colors based on the calculated value as shown in the following figure:



Note: A map data set may contain polygons that describes not only a geographic maps but also other shapes and structures. For example, one may have a "map" describing the surface of an integrated electronic circuit and the data will describe failure rate in production for each section of the circuit. Using standard SAS programming, you can create a "Map" data set of your own.

KPI Chart

A KPI (**Key Performance Indicator**) is a chart that displays range of possible values divided into segments with different color for each segment. On top of these segments there is an indicator for the current value and optionally an indicator for the target value. A KPI can have variety of forms (Dial, Speedometer etc.) and they are used to quickly illustrate in a condense chart the value of one metric important to the organization (like sales vs. target or budget vs. actual) on a scale of colors that represents segments like "Below expectation - Red", "Within expectation - Yellow" and "Above expectation - Green". Usually the range of values is normalized into a range of 0 to 100 representing percentages instead of the actual values. For example, instead of displaying the distance of current sales value (\$ 1,235,000) to target value (\$ 2,000,000) as \$ 765,000, one may calculates this distance value as a percentage $(765,000 / 2,000,000) = 38.25\%$.



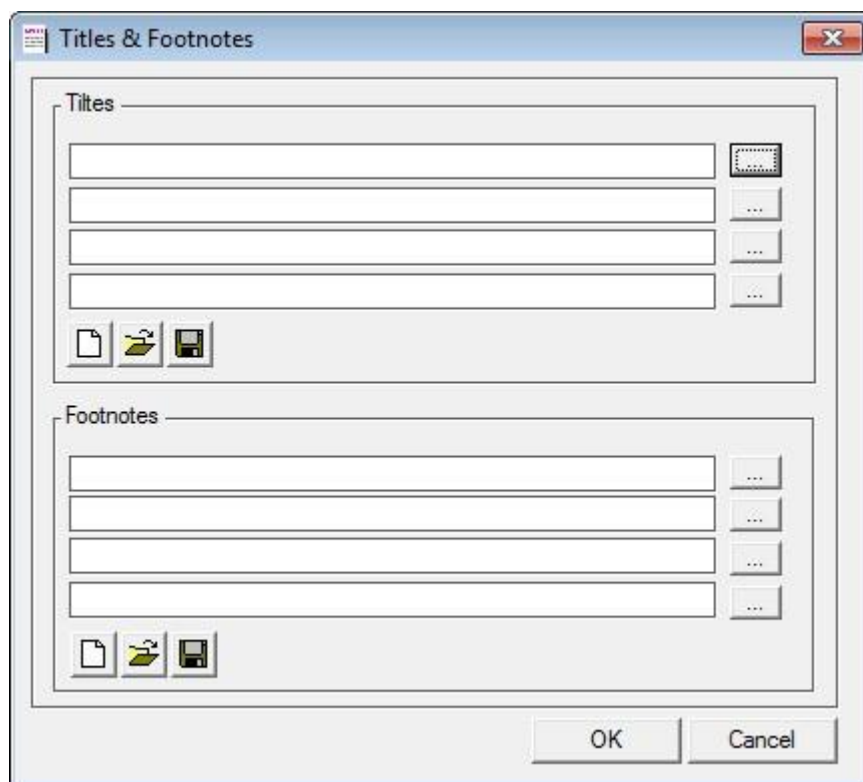
In order to chart KPI's your data must include at least one observation with a numeric variable holding the "Value" to chart. A KPI chart is produced for every observation in the data set. Optional variables can hold the "Label" for that KPI which is displayed on top of the KPI itself and a numeric "Target" variable. More optional variables can hold the segments values and colors and also the type of KPI chart to draw. These optional variables will be described later.

Usually KPI's are grouped together to form a "Dashboard" for executives like the one shown below which was created solely using %Visual graphics window with some "Advanced..." options selected to form this Excel2010 dashboard describing sales Vs. target at some airport locations in USA.

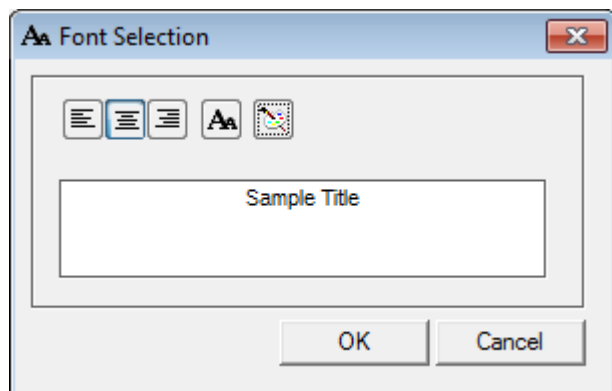


Titles Window

A graph may have up to 4 lines of titles and up to 4 lines of footnotes.



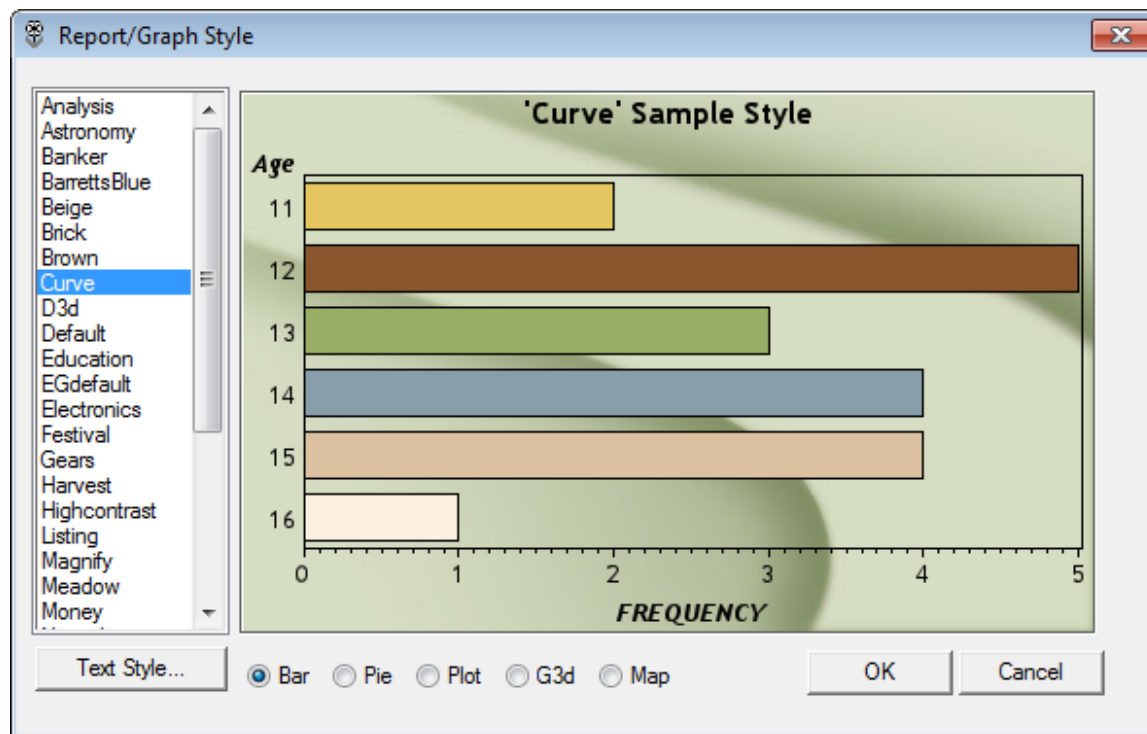
Each line has its own font, color and justification attributes controlled via the "..." push buttons that displays the following window:



Style Window

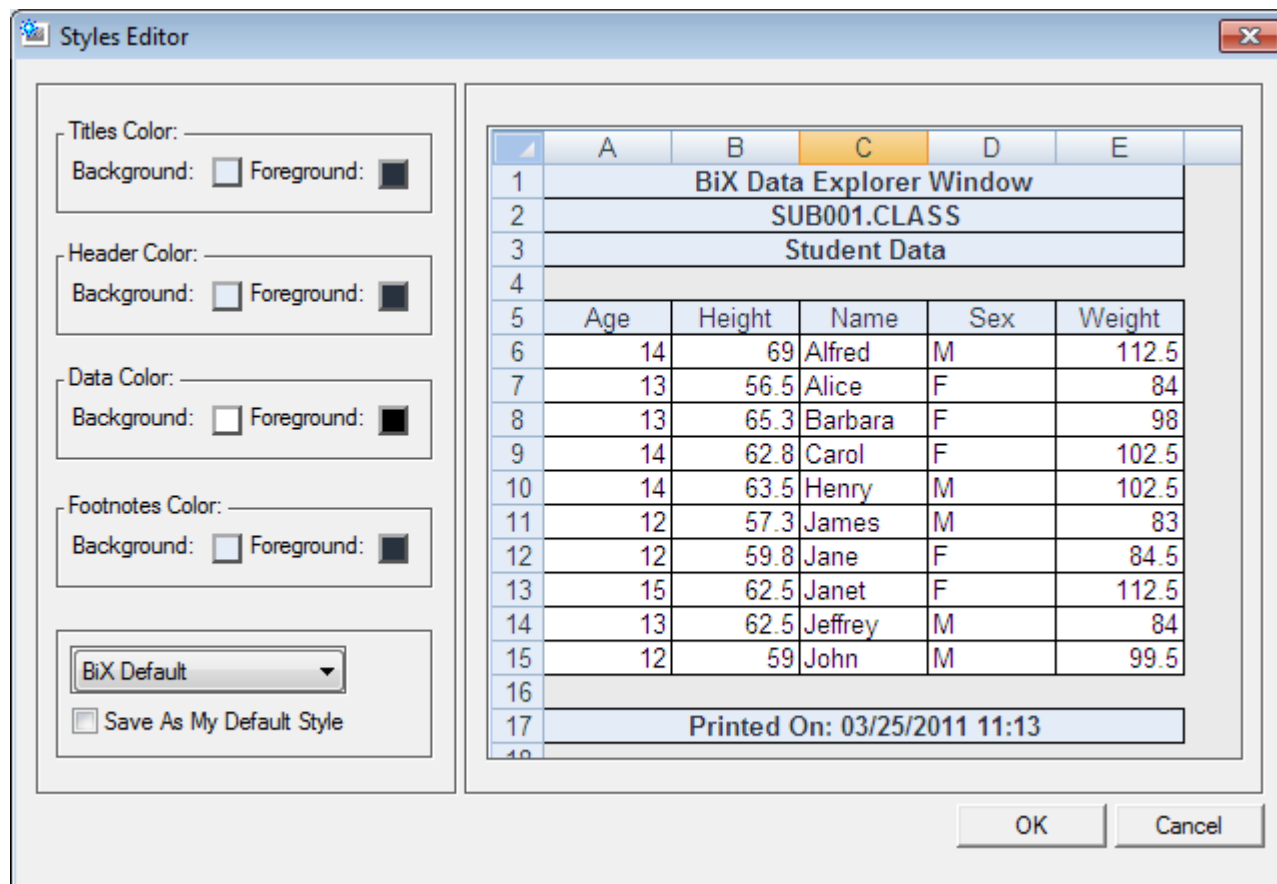
Selecting Style for the chart

A chart appearance is controlled by a "Style" definition. The style handles aspects of colors, fonts background etc. %Visual allow to select from SAS predefined set of styles and optionally override parts of that style for a specific customization of the chart. The "Style" window display a preview of the style as displayed in the following figure:

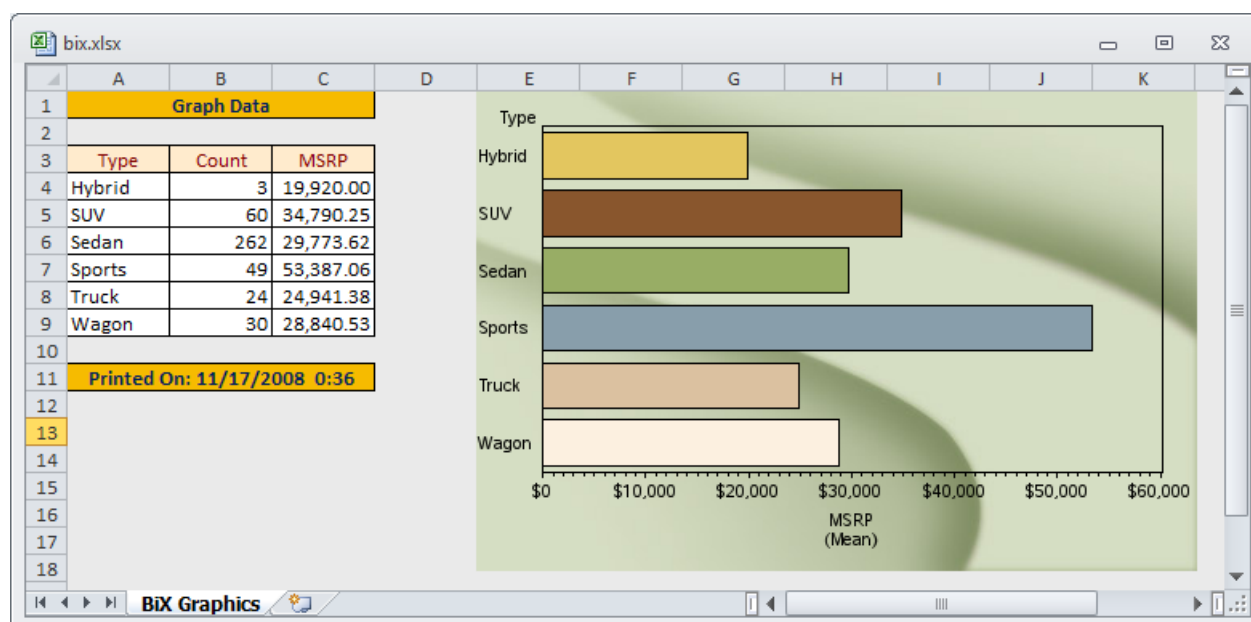


Selecting Style for Text

Whenever a chart is published it is always accompanied by its underlying data. The "Style" window allow you to select the style for the textual part of the published chart:



You can select an Excel style from several predefined %Visual styles or even design your own style. The final result inside the Excel2010 spreadsheet may look like the following figure:

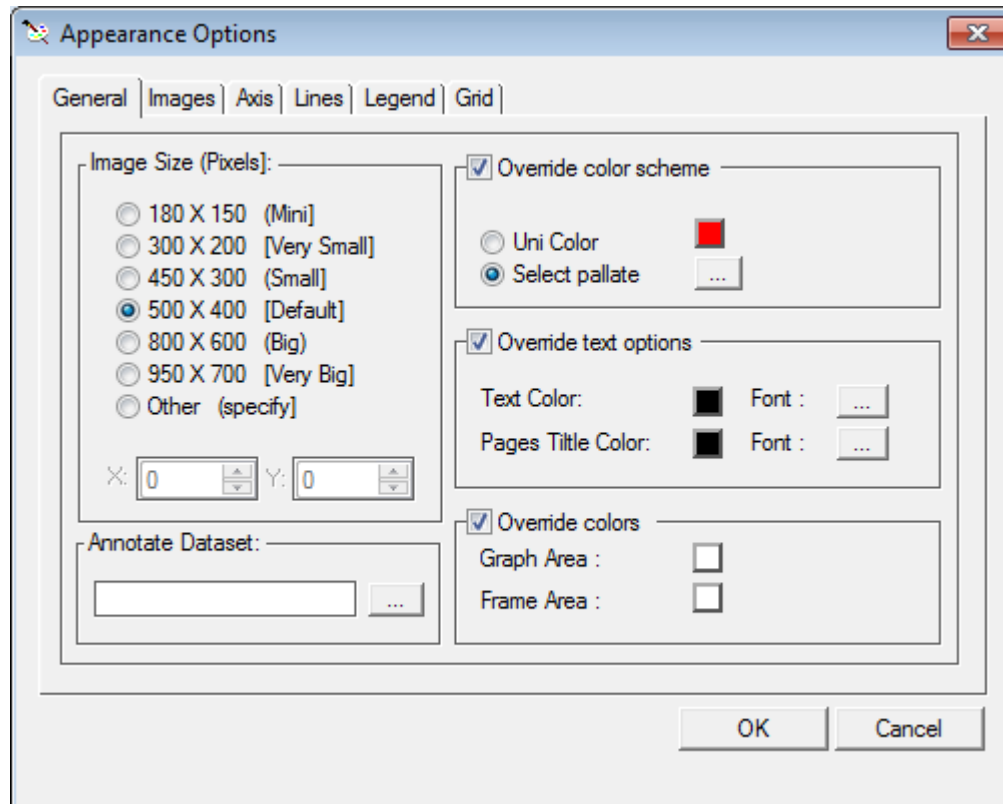


Appearance Window

The appearance window controls options shared by all or most of the chart types. These appearance options are organized in several tabs. Many of the options inherit their attributes from the selected style, and if you wish to modify that inheritance and specify your own value, you should check the "Override" check-box first.

The General Tab

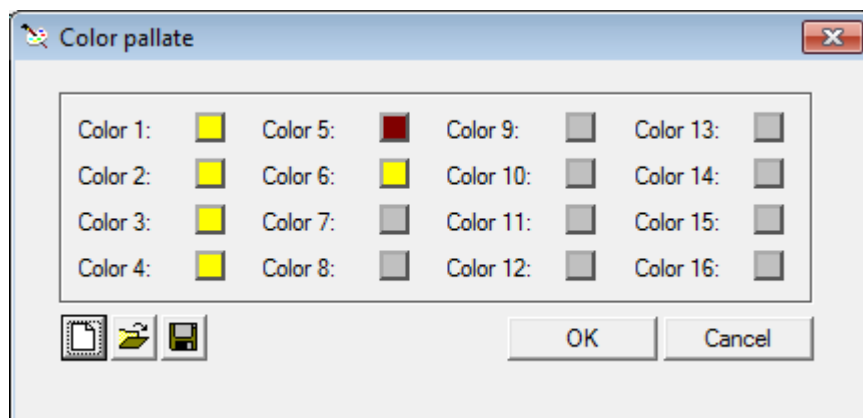
Contains options for controlling the size of the image file (in pixels), colors and fonts used for the chart.



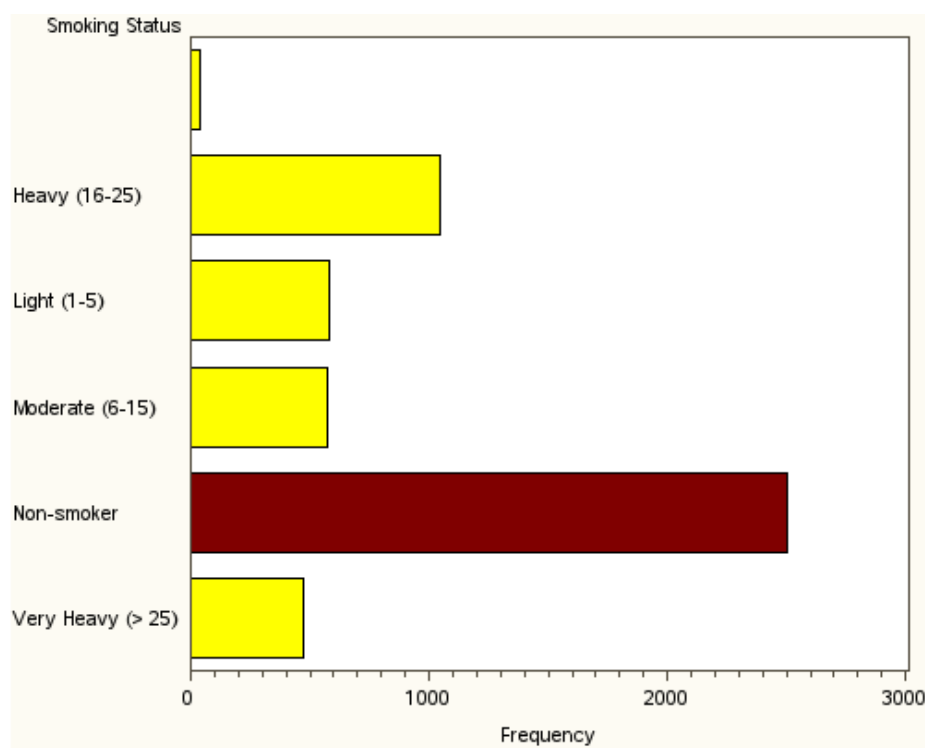
Feature	Description
Image Size	The default image size is 500X400 pixels which is the size of the graphic area inside the window. Thus default graph will always fit into the window exactly. You can select different sizes to fit your needs. For example, A KPI graph will usually be of a smaller size since KPI are grouped together to form a dashboard. For a KPI, the recommended size is Very Small (300X200) or even Mini (180X150).
Annotate data set	Specify a SAS data set that contains SAS annotate facility commands. Annotate is a known SAS technique to enhance and add graphic elements to a chart. The discussion scope of Annotate facility is beyond this document. For further reading about the Annotate facility please refer to SAS documentation.

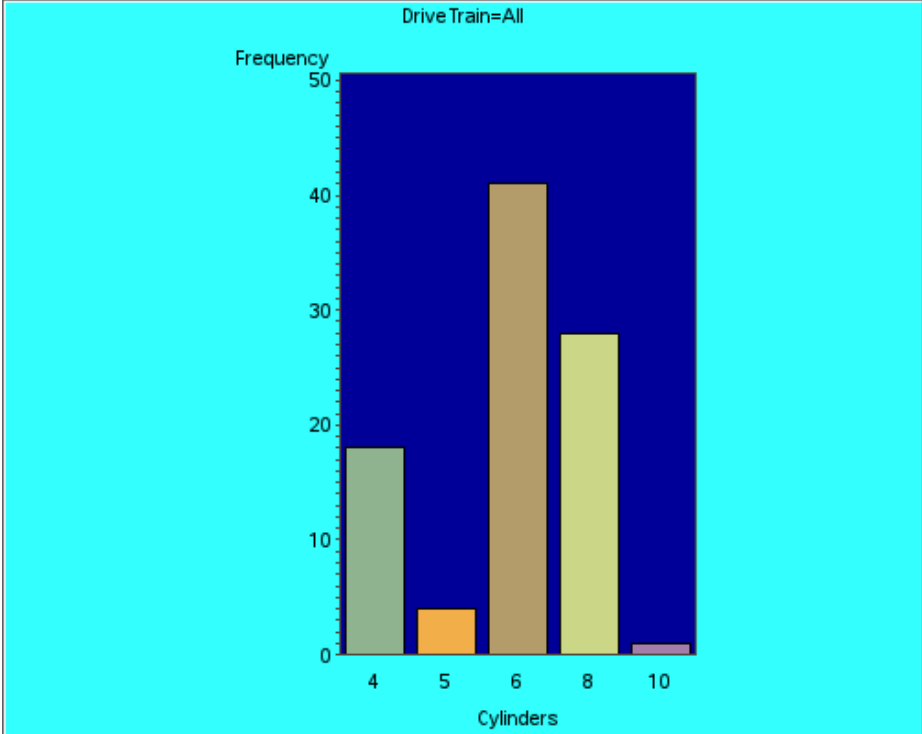
Color Scheme

The color scheme is determined by the style selected for the chart. Colors for slices or bars and for background are all stored in the style definition. You can override colors assigned for slices and bars by selecting this option. You can choose from two methods: 1) **Uni Color** where all slices or bars are colored by the same selected color, or 2:) **Palate** of colors which are selected by the following window:



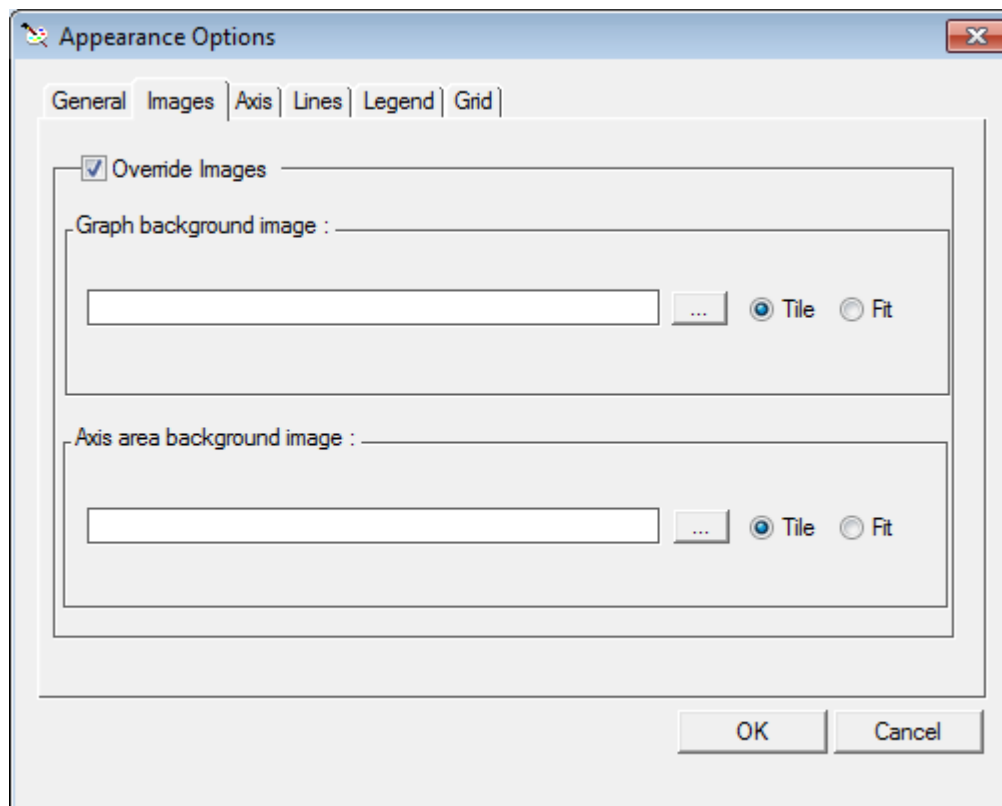
In the "Color Palate" window shown above you can select up to 16 colors. For example, if you wish to emphasize a specific bar with a different color than other bars, then you can select the same color for all of the 16 colors except for the color(n) for your bar/slice. Notice that colors are assigned to slices or bars according to their relative position in the chart as displayed in the following figure:



Text Options	Overriding this options selects the default font and color for any text in the chart. You can change this defaults for a specific part of the graph in other windows.												
Colors	The color for the graph area is a background color for the area of the whole parts of the chart while if your chart as a frame (Bars and Plots) then you can also select a color for this specific part as displayed in the following figure:  <table border="1"><caption>Data for Drive Train=All</caption><thead><tr><th>Cylinders</th><th>Frequency</th></tr></thead><tbody><tr><td>4</td><td>18</td></tr><tr><td>5</td><td>4</td></tr><tr><td>6</td><td>41</td></tr><tr><td>8</td><td>28</td></tr><tr><td>10</td><td>1</td></tr></tbody></table>	Cylinders	Frequency	4	18	5	4	6	41	8	28	10	1
Cylinders	Frequency												
4	18												
5	4												
6	41												
8	28												
10	1												

The Images Tab

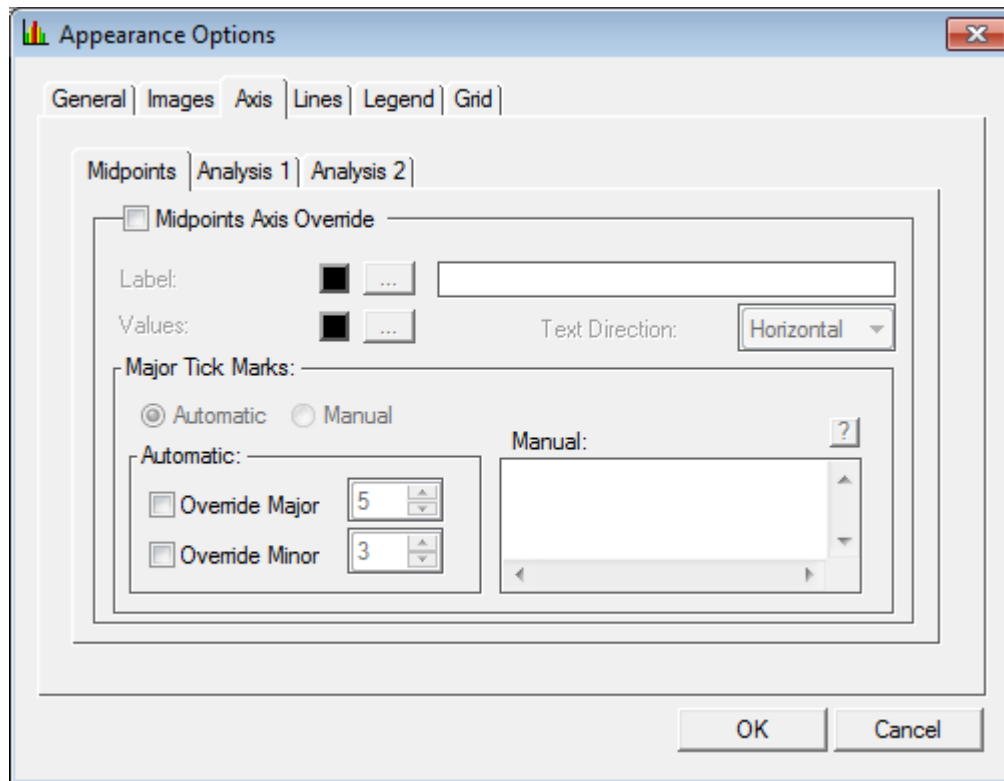
Some of SAS software supplied styles contains image definition that are applied to background of charts. If you wish to select your own background images then select the override check box and select a *.gif or *.jpg images. If a chart is assigned a background image then the background color attribute is overridden.



Feature	Description														
Chart Background Image	An image for the whole chart. The image can be either "Tiled" which means the image will be duplicated to fill the whole area or "Fitted" which means the image will be stretched to fill the area.														
Axis area Background Image	If your chart has an axis frame (Bar and Plot) then you can select a different image for this part of the chart as displayed in the following figure:  <table border="1"> <thead> <tr> <th>Smoking Status</th> <th>Frequency (approx.)</th> </tr> </thead> <tbody> <tr> <td>Smoking Status</td> <td>50</td> </tr> <tr> <td>Heavy (16-25)</td> <td>1000</td> </tr> <tr> <td>Light (1-5)</td> <td>500</td> </tr> <tr> <td>Moderate (6-15)</td> <td>500</td> </tr> <tr> <td>Non-smoker</td> <td>2500</td> </tr> <tr> <td>Very Heavy (> 25)</td> <td>400</td> </tr> </tbody> </table>	Smoking Status	Frequency (approx.)	Smoking Status	50	Heavy (16-25)	1000	Light (1-5)	500	Moderate (6-15)	500	Non-smoker	2500	Very Heavy (> 25)	400
Smoking Status	Frequency (approx.)														
Smoking Status	50														
Heavy (16-25)	1000														
Light (1-5)	500														
Moderate (6-15)	500														
Non-smoker	2500														
Very Heavy (> 25)	400														

The Axis Tab

The Axis tab control the appearance of the X & Y Axis of a bar chart or 2D Plot chart. In horizontal bar chart the X axis is actually the vertical axis on the left side of the bar chart.



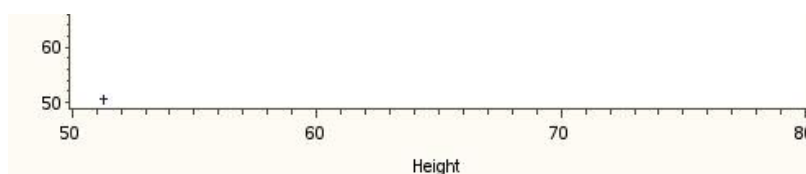
Feature	Description														
Label	Select the label text, font and color for the label of the X axis. Usually the axis label is the label (or name, if there is no label) of the variable assigned to the X Axis.														
Values	Select the font and color for the text of tick marks.														
Text Direction	Select the direction of text of tick marks. In the following example font, color and text direction has been changed for the chart: <table border="1"> <caption>Vehicle Type Distribution</caption> <thead> <tr> <th>Vehicle Type</th> <th>Relative Frequency (approximate)</th> </tr> </thead> <tbody> <tr> <td>Hybrid</td> <td>0.1</td> </tr> <tr> <td>SUV</td> <td>0.4</td> </tr> <tr> <td>Sedan</td> <td>0.5</td> </tr> <tr> <td>Sports</td> <td>0.3</td> </tr> <tr> <td>Truck</td> <td>0.2</td> </tr> <tr> <td>Wagon</td> <td>0.2</td> </tr> </tbody> </table>	Vehicle Type	Relative Frequency (approximate)	Hybrid	0.1	SUV	0.4	Sedan	0.5	Sports	0.3	Truck	0.2	Wagon	0.2
Vehicle Type	Relative Frequency (approximate)														
Hybrid	0.1														
SUV	0.4														
Sedan	0.5														
Sports	0.3														
Truck	0.2														
Wagon	0.2														

Major Tick Marks

You can select one of two methods to control the number of tick marks:

1. **Automatic Method** - SAS chooses the best number for major and minor tick marks. For bar charts with ordinal type of variable assigned to the X axis, it will create a bar for each distinct value. For plot chart with nominal (continuous values) variable the number can be controlled by selecting and overriding the automatic values.

The following figure shows a plot chart with default automatic assignment of tick marks:



In the following example the number of tick marks has been changed to 6 major tick marks and zero (none) minor tick marks:

Major Tick Marks:

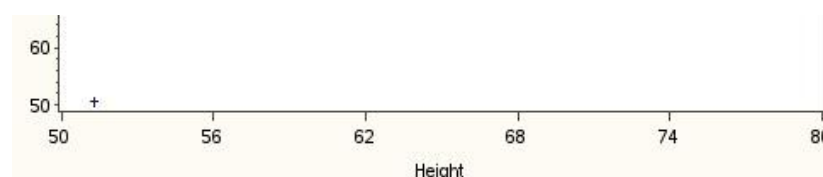
☒ Automatic ☐ Manual

Automatic:

☒ Override Major 6

☒ Override Minor 0

The resulting X axis tick marks are shown below:



2. **Manual Method** - selecting specific values to be set as tick marks.

Major Tick Marks:

☐ Automatic ☒ Manual

Automatic:

☒ Override Major 6

☒ Override Minor 0

Manual: 50 60 70 80

You can set values for tick marks in many ways as described in the little help menu shown while pressing the "?" push button:
The manual method is most helpful to control tick marks intervals of date or datetime variables.

	12 For Numeric Variables: n1 n2 n3 ... Example: 2 4 6 Example: 6 4 2 n1 TO n2 <By Increment> Example: 2 TO 10 BY 2 Example: 50 TO 10 BY -5 ab For Character Variables: 'Value-1' 'Value-2' <...'Value-n'> Example: 'Paris' 'London' 'New York' For Date/Time/Datetime Variables: 'Value-1' 'Value-2' <...'Value-n'> Example: '20JAN2011'd '20MAR2011'd '20APR2011'd Example: '9:00't '9:15't '9:30't Example: '20JAN2011:10:00:00'dt '20JAN2011:10:15:00'dt '20JAN2011:10:30:00'dt 'Value-1' TO 'Value-2' <BY interval> Example: '20JAN2011'd TO '20APR2011'd BY week Example: '9:00't TO '23:00't BY hour Example: '20JAN2011:00:00:00'dt TO '21JAN2011:23:59:59'dt BY hour
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Y1 & Y2 Axis Tabs

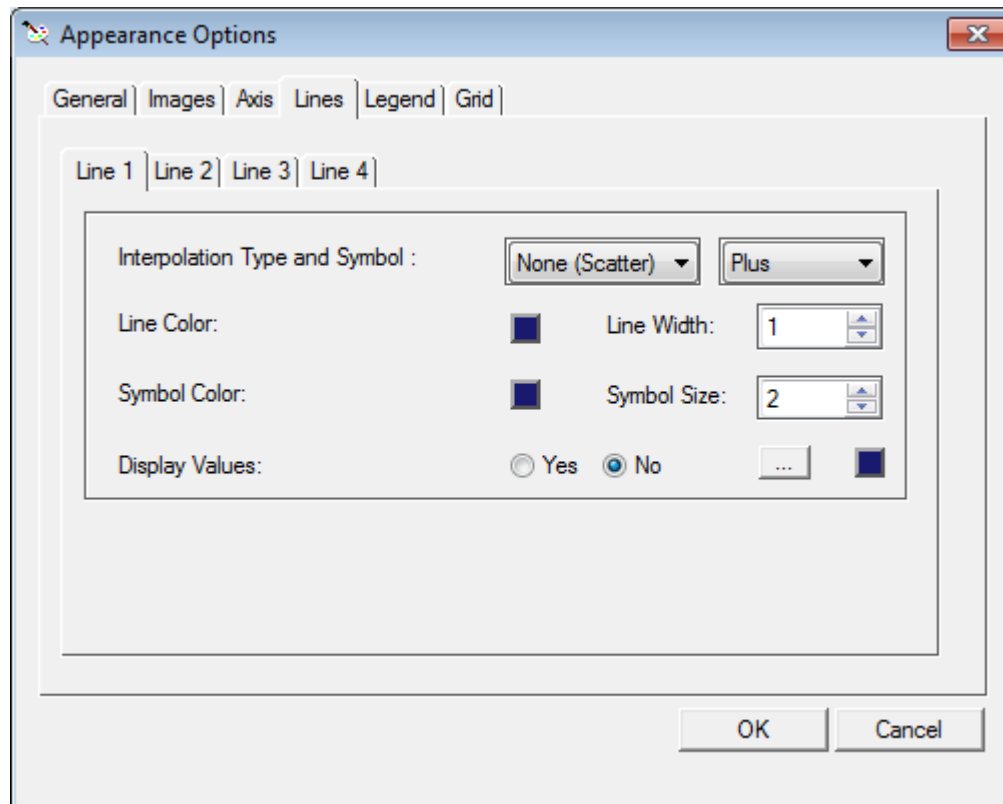
For bar charts use the Y1 axis while for Plot charts you can assign two Y axis: one on the left side and one on the right side of the chart each displaying different statistical measures on the same common X axis. Definitions for Y1 and Y2 axis are the same as for the X axis.

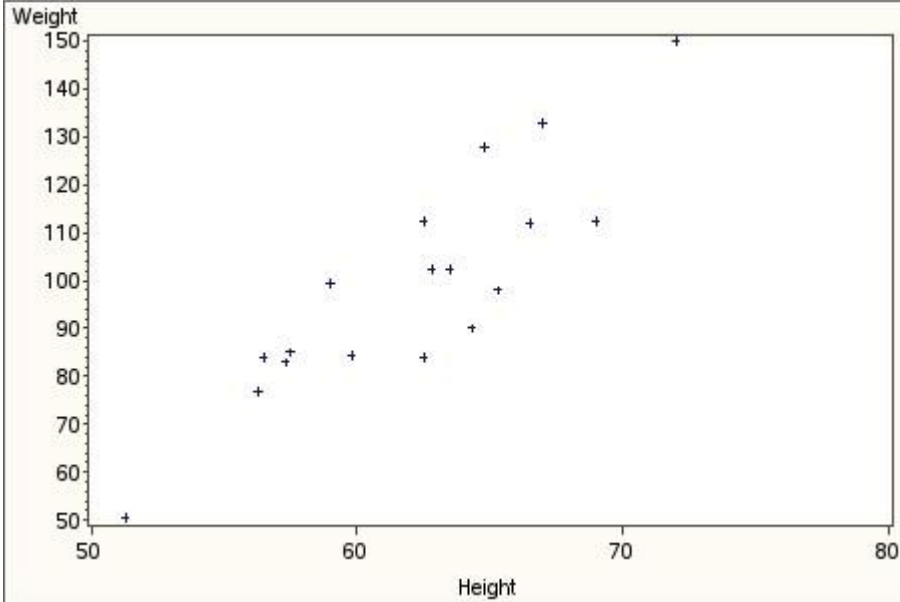
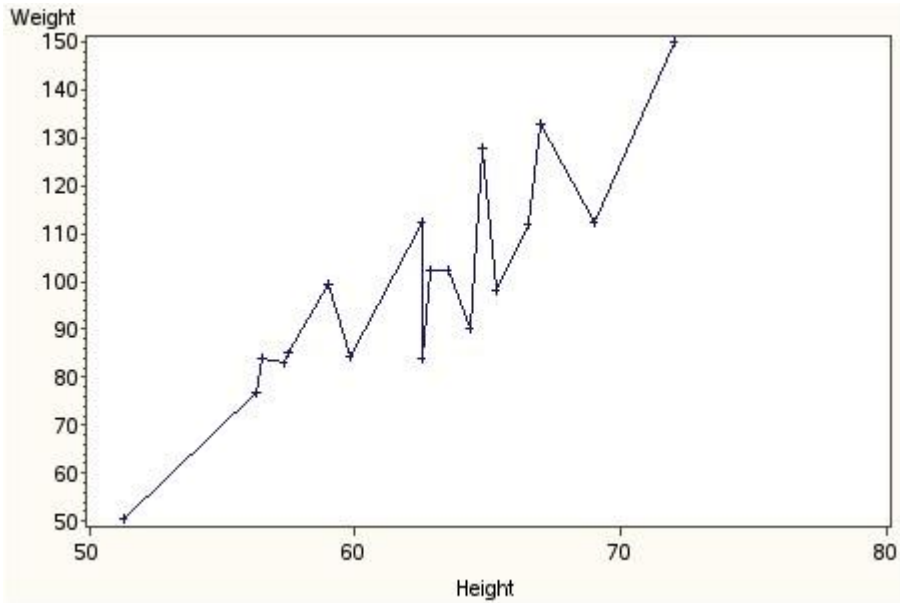
The Lines Tab

Note: The lines tab effects only a 2D plot chart or the plot part of a Barline chart.

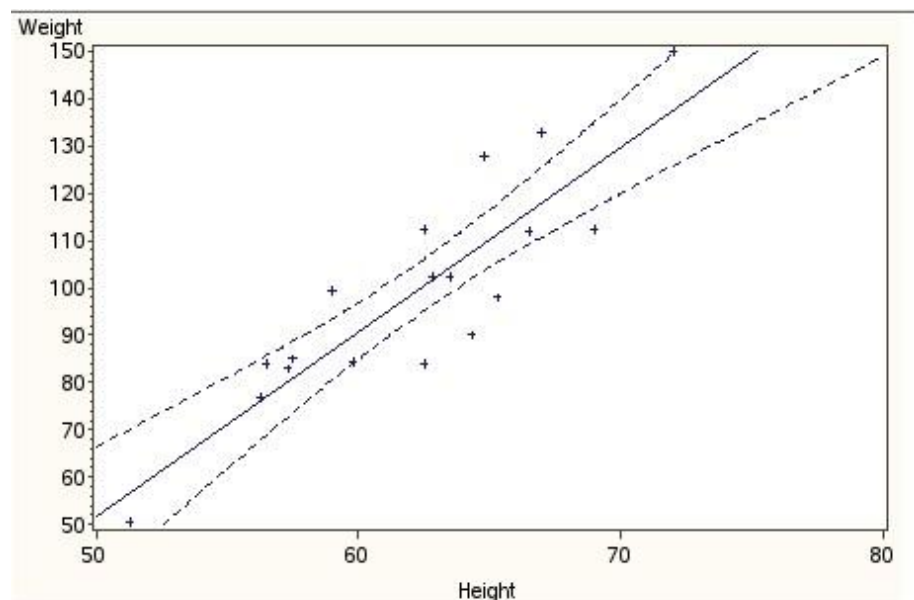
%Visual allows you to specifically control up to 4 lines. Multiple lines in a plot chart can be created either by specifically selecting two Y variables (which will result into two groups of points that may be connected with two distinct lines, or by selecting a "Group" variable which can result into multiple lines depending on the number of distinct values of this "Group" variable has. In this scenario, only the first 4 lines are editable and the rest of the lines inherits their attributes form the style.

Note: a plot chart with many multiple lines can become cluttered and uneasy to interpret.



Feature	Description																																		
Interpolation Type & Symbol	Default behavior is to create a scatter chart where points are not connected. Each point is represented by default with a "+" (Plus) sign:  A scatter plot showing the relationship between Height (X-axis, 50 to 80) and Weight (Y-axis, 50 to 150). The data points are represented by '+' symbols. The points are scattered, showing a general upward trend with some fluctuations. <table border="1"><thead><tr><th>Height</th><th>Weight</th></tr></thead><tbody><tr><td>52</td><td>50</td></tr><tr><td>55</td><td>75</td></tr><tr><td>56</td><td>85</td></tr><tr><td>57</td><td>88</td></tr><tr><td>59</td><td>100</td></tr><tr><td>60</td><td>85</td></tr><tr><td>63</td><td>85</td></tr><tr><td>64</td><td>115</td></tr><tr><td>65</td><td>105</td></tr><tr><td>66</td><td>105</td></tr><tr><td>67</td><td>128</td></tr><tr><td>68</td><td>90</td></tr><tr><td>69</td><td>100</td></tr><tr><td>70</td><td>115</td></tr><tr><td>72</td><td>135</td></tr><tr><td>73</td><td>150</td></tr></tbody></table>	Height	Weight	52	50	55	75	56	85	57	88	59	100	60	85	63	85	64	115	65	105	66	105	67	128	68	90	69	100	70	115	72	135	73	150
Height	Weight																																		
52	50																																		
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67	128																																		
68	90																																		
69	100																																		
70	115																																		
72	135																																		
73	150																																		
	However, you can select from several different methods to connect the points with: 1. "Join" - connect the points with a straight line :  A line plot showing the same data points as the scatter plot, but connected by straight lines. The line starts at (52, 50) and ends at (73, 150), following the path of the data points. The line is jagged, reflecting the fluctuations in the data. <table border="1"><thead><tr><th>Height</th><th>Weight</th></tr></thead><tbody><tr><td>52</td><td>50</td></tr><tr><td>55</td><td>75</td></tr><tr><td>56</td><td>85</td></tr><tr><td>57</td><td>88</td></tr><tr><td>59</td><td>100</td></tr><tr><td>60</td><td>85</td></tr><tr><td>63</td><td>115</td></tr><tr><td>64</td><td>85</td></tr><tr><td>65</td><td>105</td></tr><tr><td>66</td><td>105</td></tr><tr><td>67</td><td>128</td></tr><tr><td>68</td><td>90</td></tr><tr><td>69</td><td>100</td></tr><tr><td>70</td><td>115</td></tr><tr><td>72</td><td>135</td></tr><tr><td>73</td><td>150</td></tr></tbody></table>	Height	Weight	52	50	55	75	56	85	57	88	59	100	60	85	63	115	64	85	65	105	66	105	67	128	68	90	69	100	70	115	72	135	73	150
Height	Weight																																		
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69	100																																		
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72	135																																		
73	150																																		

3. "Regression" - draw a linear regression line + confidence intervals:



Note: %Visual always automatically sorts the values by X variable prior to drawing the 2D plot chart.

Line Color & Width

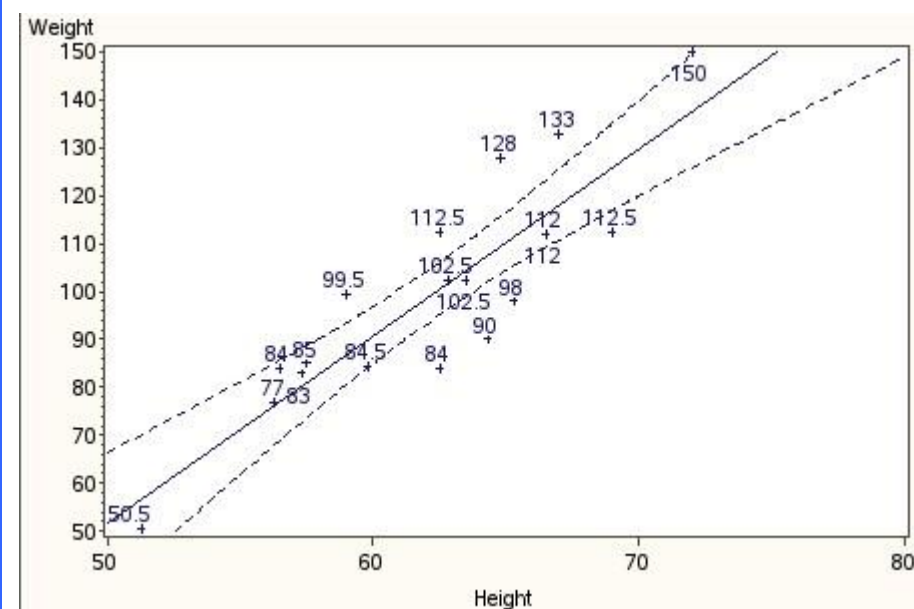
If the interpolation method creates a connecting line, Selects the color and the width of the connecting line.

Symbol Color & Size

Selects the color and size of the symbol used for the points in the chart.

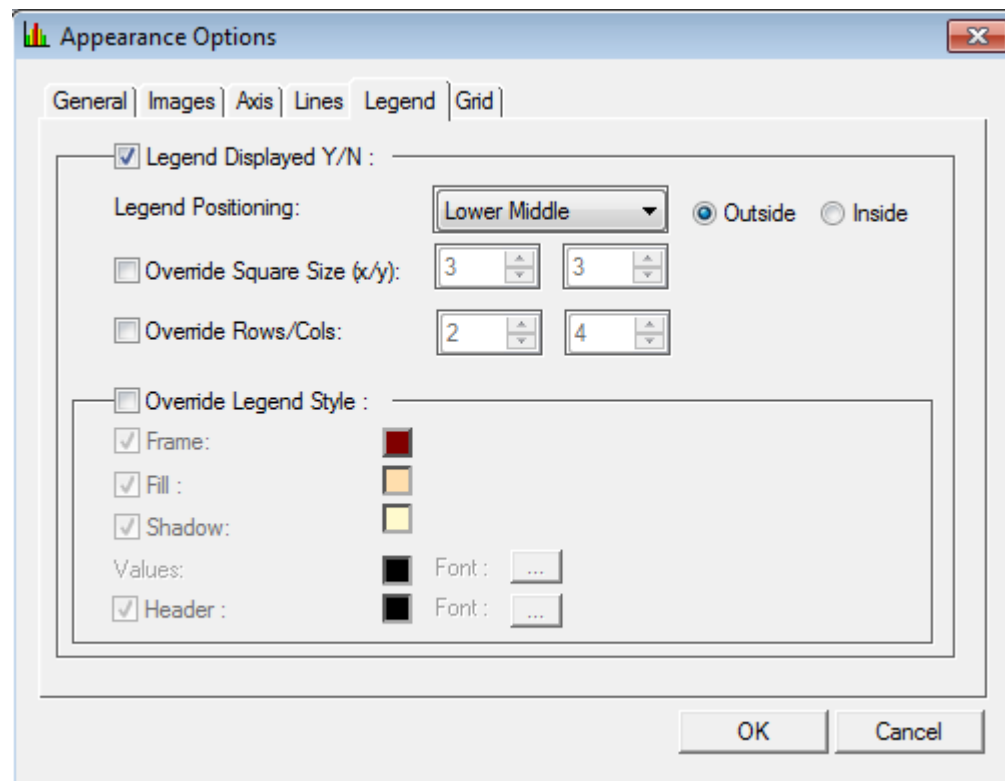
Display Values

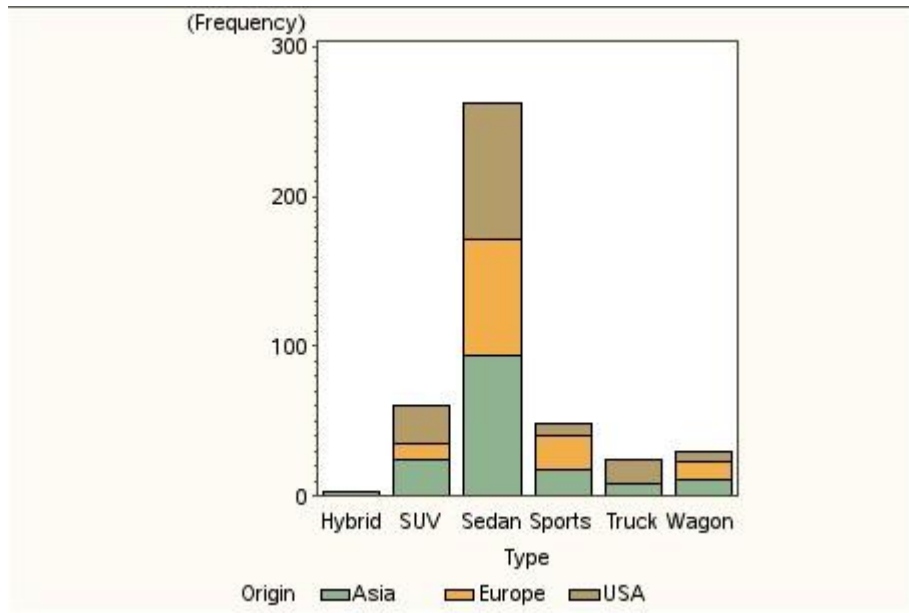
Shows the X axis value of each point in the chart. You can select the font and color used for labeling the points.



The Legend Tab

The legend is automatically created for bar charts with subgroup variables, for map charts and for 2D plot charts with two Y variables (Y1 and Y2).



Feature	Description																																			
Legend Positioning	Position the legend in one of 8 places around the chart. You can select if the legend will overlap with the chart itself (Inside) or will be created outside of the chart area. the following example shows default legend positioning: <table><caption>Estimated Frequency Data from Chart</caption><thead><tr><th>Type</th><th>Asia</th><th>Europe</th><th>USA</th><th>Total</th></tr></thead><tbody><tr><td>Hybrid</td><td>5</td><td>0</td><td>0</td><td>5</td></tr><tr><td>SUV</td><td>25</td><td>10</td><td>25</td><td>60</td></tr><tr><td>Sedan</td><td>95</td><td>75</td><td>90</td><td>260</td></tr><tr><td>Sports</td><td>20</td><td>10</td><td>10</td><td>40</td></tr><tr><td>Truck</td><td>10</td><td>10</td><td>5</td><td>25</td></tr><tr><td>Wagon</td><td>10</td><td>10</td><td>5</td><td>25</td></tr></tbody></table>	Type	Asia	Europe	USA	Total	Hybrid	5	0	0	5	SUV	25	10	25	60	Sedan	95	75	90	260	Sports	20	10	10	40	Truck	10	10	5	25	Wagon	10	10	5	25
Type	Asia	Europe	USA	Total																																
Hybrid	5	0	0	5																																
SUV	25	10	25	60																																
Sedan	95	75	90	260																																
Sports	20	10	10	40																																
Truck	10	10	5	25																																
Wagon	10	10	5	25																																

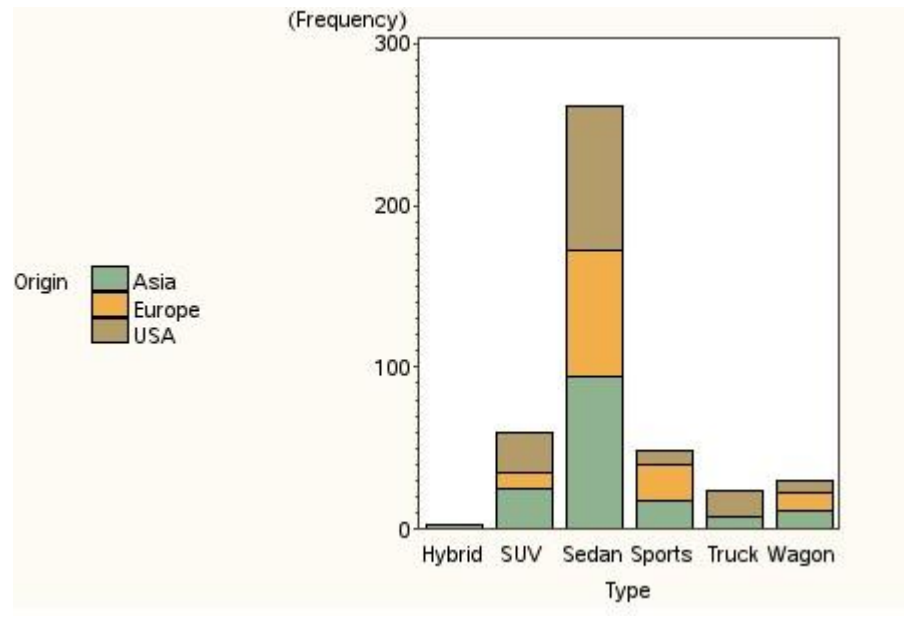
The following figure shows a legend on the "Middle Left" positioning arranged in one column and three rows:

☒ Legened Displayed Y/N :

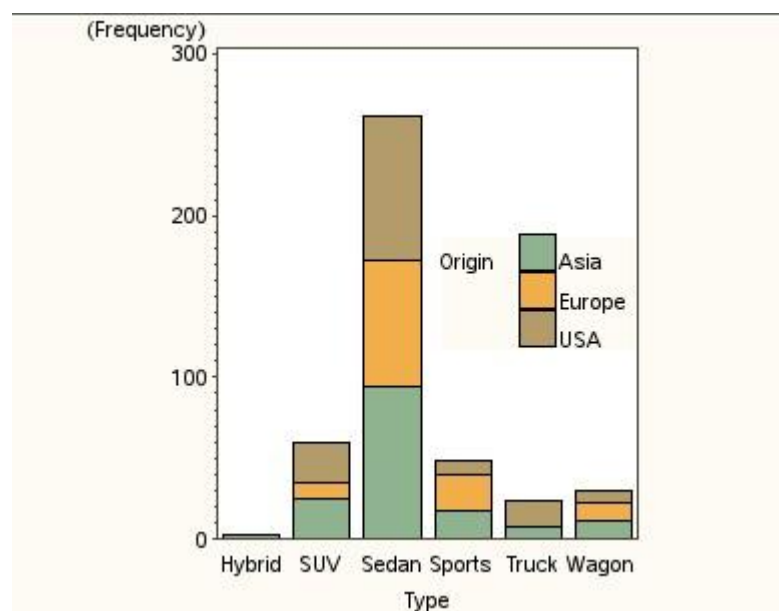
Legend Positioning: Middle Left ☒ Outside ☐ Inside

☒ Override Square Size (x/y): 4 4

☒ Override Rows/Cols: 3 1



The following example shows an "Inside Middle Right" positioning:



Legend Style

Controls the color, font and shadow of the legend bar:

☒ Override Legened Style :

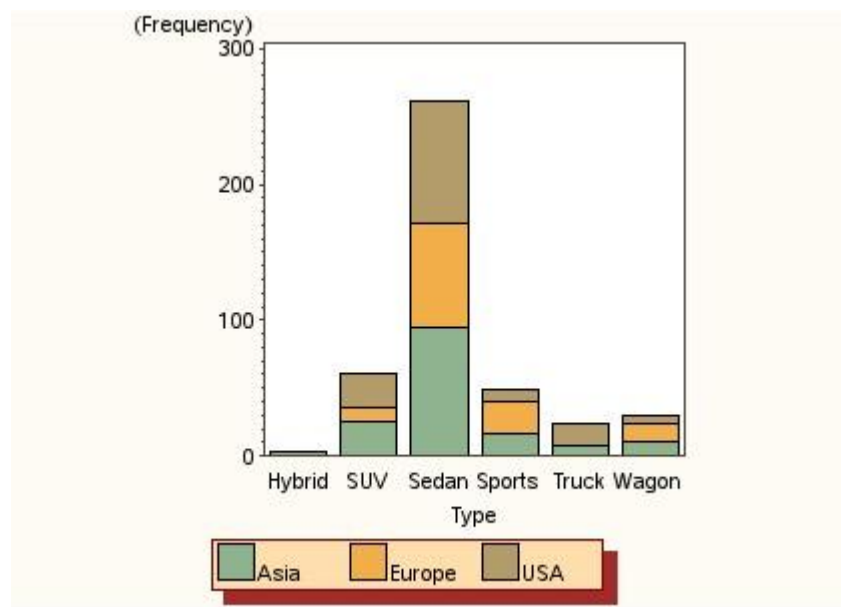
☒ Frame: 

☒ Fill : 

☒ Shadow: 

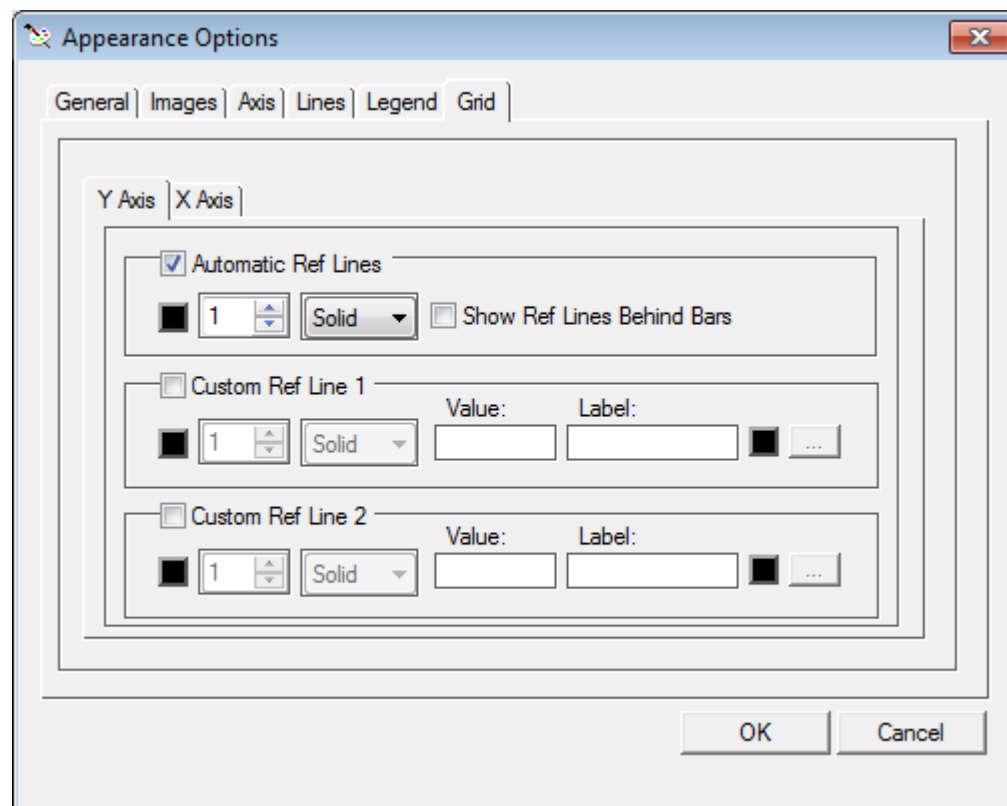
Values:  Font : 

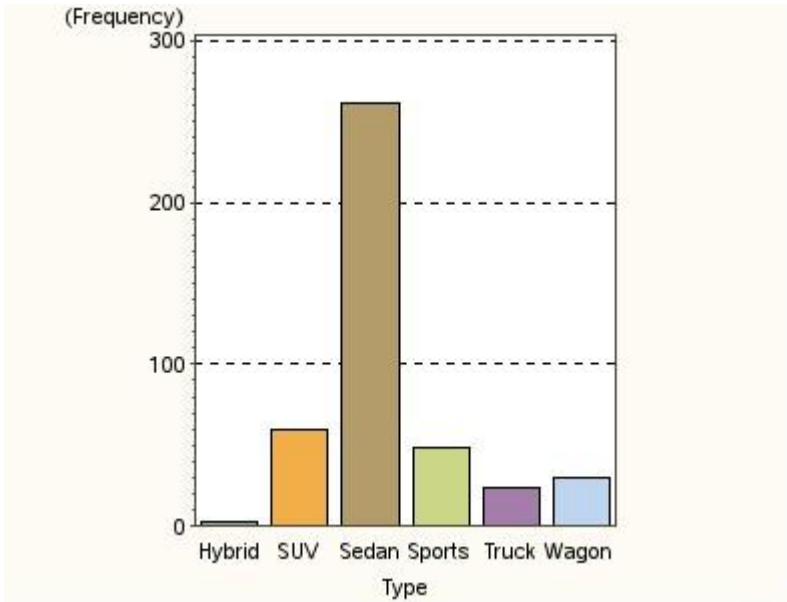
☐ Header :  Font : 



The Grid Tab

Note: Grid tab affects bar charts, 2D plot charts and Barline charts.



Feature	Description														
Automatic Ref Lines	Creates a line on every major tick mark. You can control the color, width and style (solid, dash or dots) of these lines.  For bar charts, you can also control if these lines will be "behind" the bars or in "front" of the bars as displayed in the following figure:  <table border="1"><caption>Bar Chart Data</caption><thead><tr><th>Type</th><th>Frequency</th></tr></thead><tbody><tr><td>Hybrid</td><td>5</td></tr><tr><td>SUV</td><td>60</td></tr><tr><td>Sedan</td><td>260</td></tr><tr><td>Sports</td><td>50</td></tr><tr><td>Truck</td><td>25</td></tr><tr><td>Wagon</td><td>30</td></tr></tbody></table>	Type	Frequency	Hybrid	5	SUV	60	Sedan	260	Sports	50	Truck	25	Wagon	30
Type	Frequency														
Hybrid	5														
SUV	60														
Sedan	260														
Sports	50														
Truck	25														
Wagon	30														

Custom Ref Line

Sets up to two custom reference lines with specific value (must be between the min and max values for that axis) and optionally sets a label for this reference line as displayed in the following figure:

Y Axis | X Axis |

☐ Automatic Ref Lines

☐ 1 ☐ Show Ref Lines Behind Bars

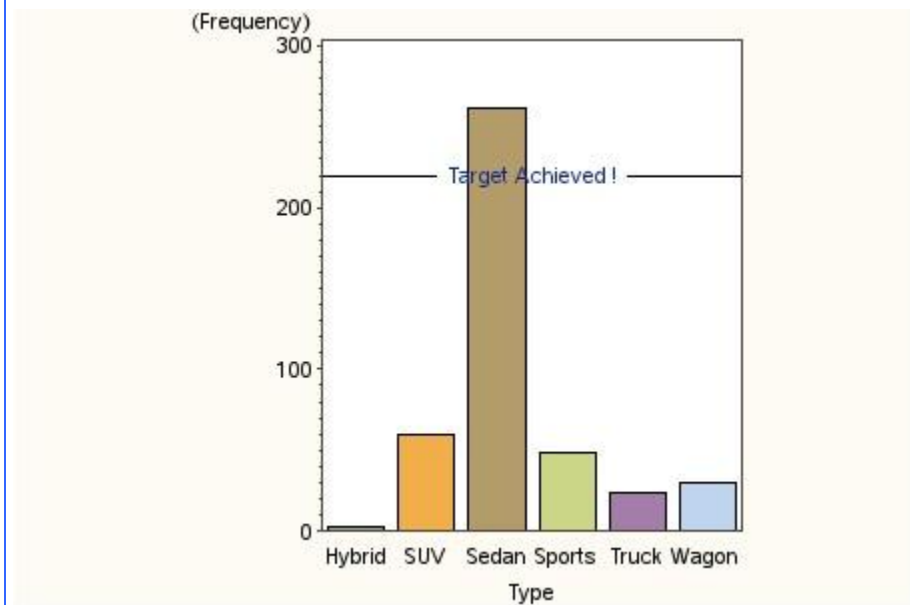
☒ Custom Ref Line 1

☐ 1 Value: 220 Label: Target Achieved

☐ Custom Ref Line 2

☐ 1 Value: Label:

Which results to the following chart:



Advanced Window

%Visual will usually produce a default chart for each of the chart types selected based upon default settings. You can override these settings to produce more tuned charts to your needs as described in the following sections.

The Pie/Donut Tab

Feature	Description
Pie Layout	2D layout is a "Flat" pie and 3D is a rotated "thick" pie. Usually the 2D representation is more readable as displayed in the following figures:
Start Angle	The angle of the first slice. Default angle is 90 degrees.

Other Threshold	Slices which have value less than 5% (default) are grouped together into the "Other" slice.														
Ascending/Descending	Slices are ordered (by default) with a descending order (counter clockwise) starting from the "Start Angle" where the "Other" slice is always shown as the last slice in the pie.														
Explode	Emphasizes one of the slices in the pie chart. You can select to explode the biggest slice or any specific slice denoted by its exact character formatted value. Explode Options: ☐ None ☐ Biggest ☒ Specify : SUV Formatted value (Case-sensitive) The resulting chart is displayed in the following figure: FREQUENCY of Type <table border="1"> <thead> <tr> <th>Car Type</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>Sedan</td> <td>262</td> </tr> <tr> <td>SUV</td> <td>60</td> </tr> <tr> <td>Sports</td> <td>49</td> </tr> <tr> <td>Wagon</td> <td>30</td> </tr> <tr> <td>Truck</td> <td>24</td> </tr> <tr> <td>Hybrid</td> <td>3</td> </tr> </tbody> </table>	Car Type	Frequency	Sedan	262	SUV	60	Sports	49	Wagon	30	Truck	24	Hybrid	3
Car Type	Frequency														
Sedan	262														
SUV	60														
Sports	49														
Wagon	30														
Truck	24														
Hybrid	3														

Text Options

Position each value of the pie chart (slice label, slice value and slice percent) in a specific location (Inside, Outside or Arrow).

Text Options :

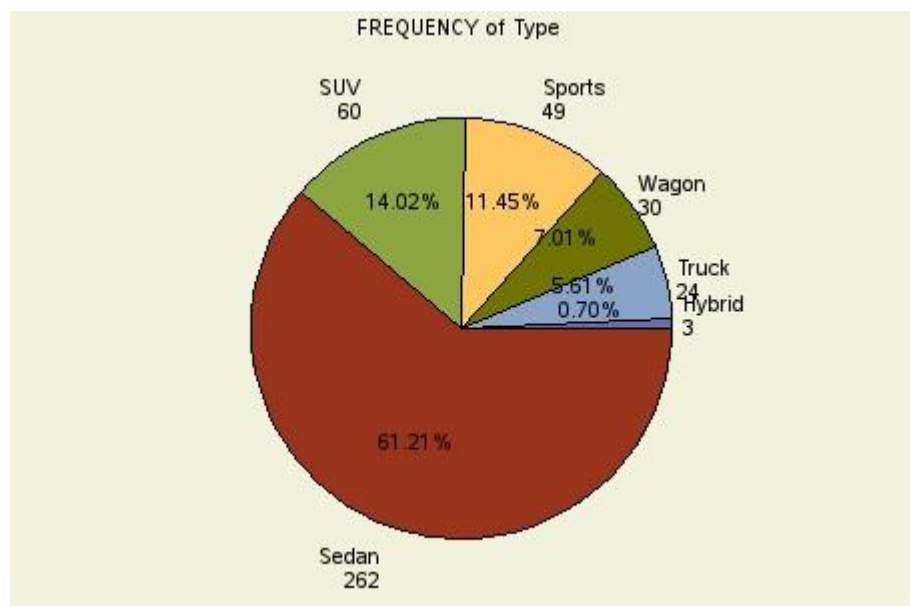
Label Position: Outside ▾

Value Position: Outside ▾

Percent Position: Inside ▾

☐ Match Colors

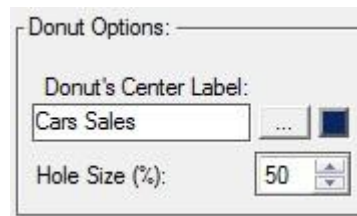
The resulting chart is displayed in the following figure:



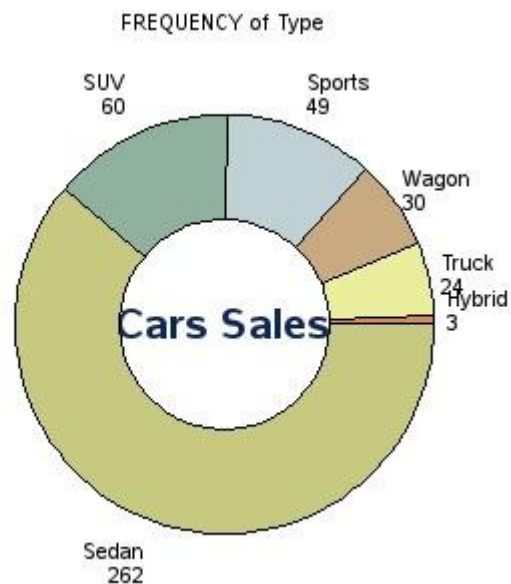
If you check the "Match colors" then the color used for text is similar to the color of the slice. (note: text located "Inside" the slice may become obscure).

Donut Options

Donut chart is similar to 2D pie but they have a "Hole" in the middle. You can set the size of the hole as a percentage of the donut diameter and optionally set a text to be placed inside the hole as displayed in the following figures:



The resulting chart is displayed in the following figure:



The Bar Tab

Advanced Graph Options

PIE/DONUT | **BAR** | 2D PLOT | 3D SURFACE | BARLINE | MAP | KPI

3D Bar Type: Hexagon

Order Bars By: Data

☐ Override Dimensions:

Bar Width: 10

Space Between Bars: 2

Space Between Groups: 5

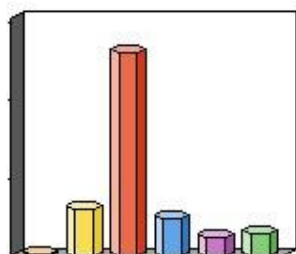
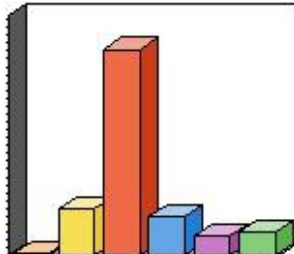
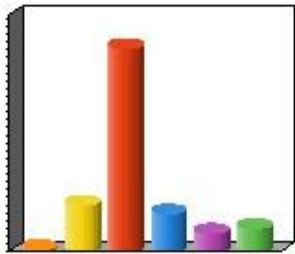
Displayed Outside Values: None

Displayed Inside Values: None (Valid for VBARS Only)

Colors By: ☒ Midpoints ☐ Groups ☐ Subgroups

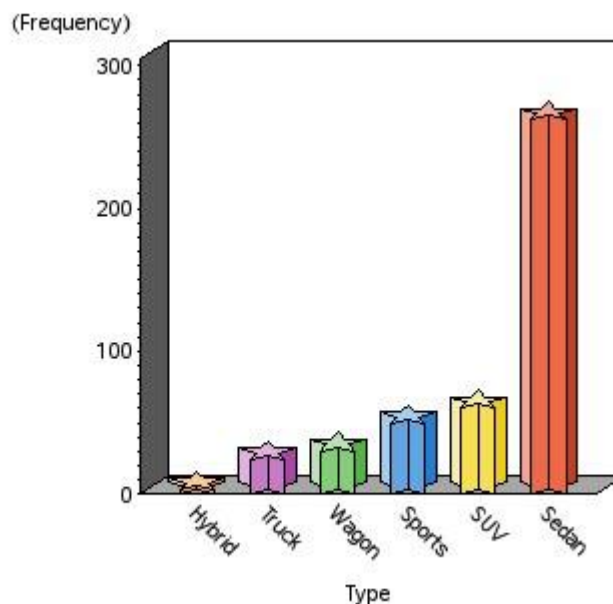
Data Type: ☒ Discrete ☐ Continues # Bars: 6

OK Cancel

Feature	Description
3D Bar Type	Applicable only for 3D vertical or horizontal Bar charts. Controls the 3D effect of the bars. Options are: Hexagon, Prism, Star, Block and Cylinder. The following charts are examples of Hexagon, Block and Cylinder respectively:   

Order Bars

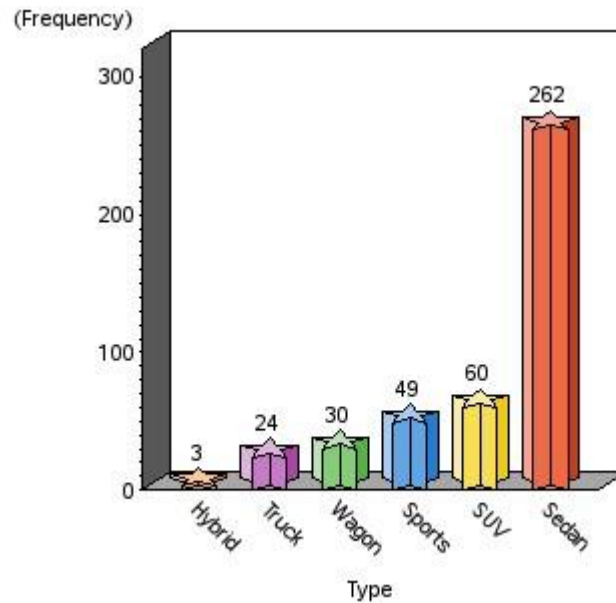
Bars are ordered (by default) by the midpoint variable values. Changing the order of bars to "Ascending" will result as the chart in the following figure:

**Dimensions**

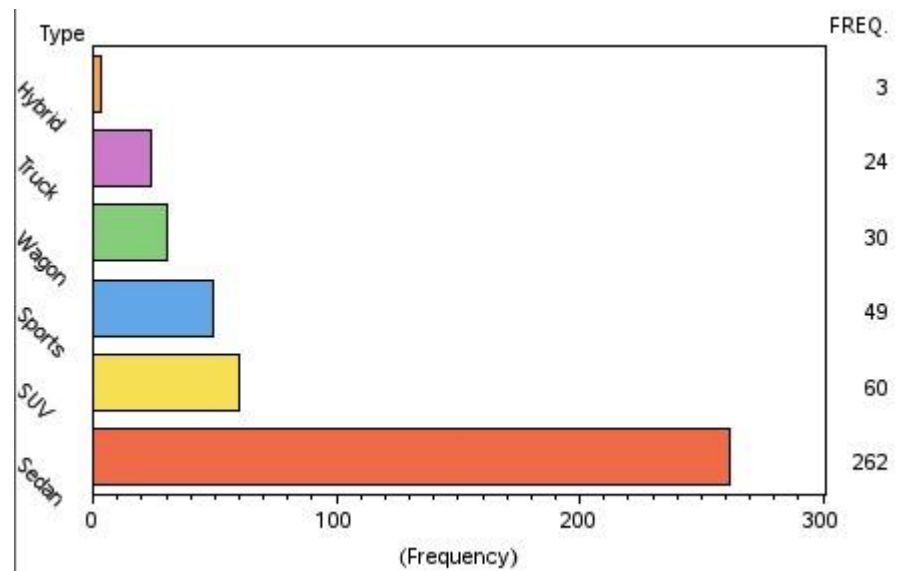
Overriding the default dimensions will enable compressing more bars to fit into the chart area or to allow a wide text to be placed on top or inside the bars.

Display Outside Values

Shows the value of the bar on top of the bar as displayed in the following figure:



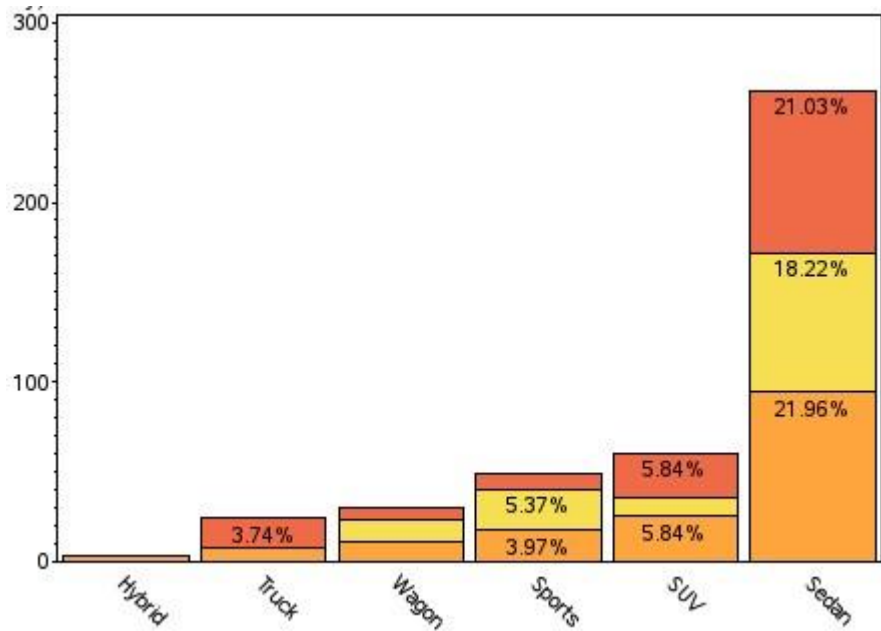
For horizontal bar charts the resulting chart is displayed in the following figure:



Please note that if the graph has no analysis variables assigned to, then you can only select "Frequency" or "Percentage" statistics to be displayed.

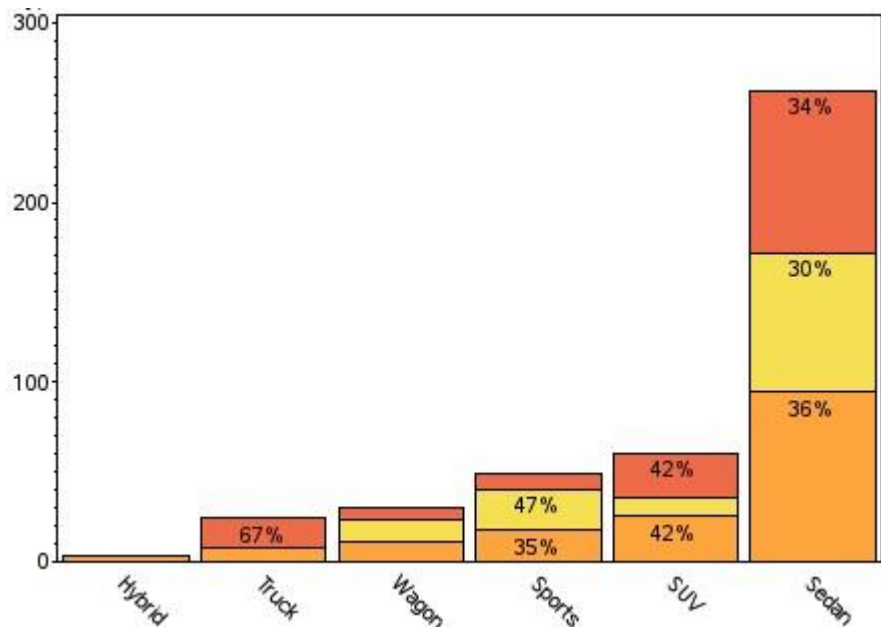
Display Inside Values

Valid for Vertical bar charts only. The following example shows percentages out of values of all bars:



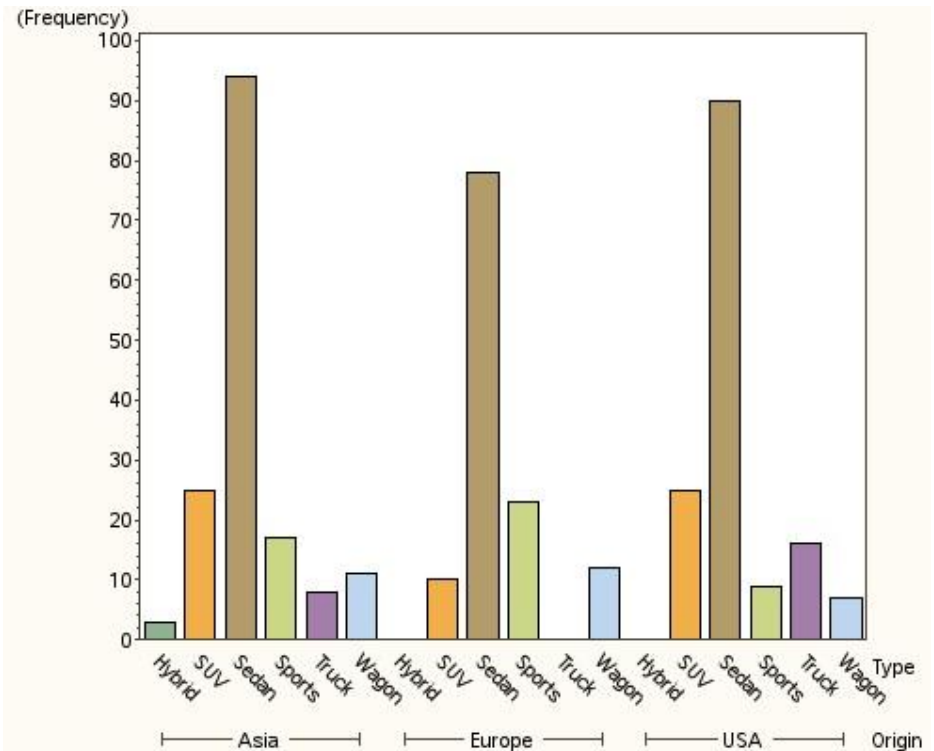
note: In the above example bar width has been extended to hold the wide percentage text.

Selecting "Subpct" statistics will show percentages for each bar representing 100%:

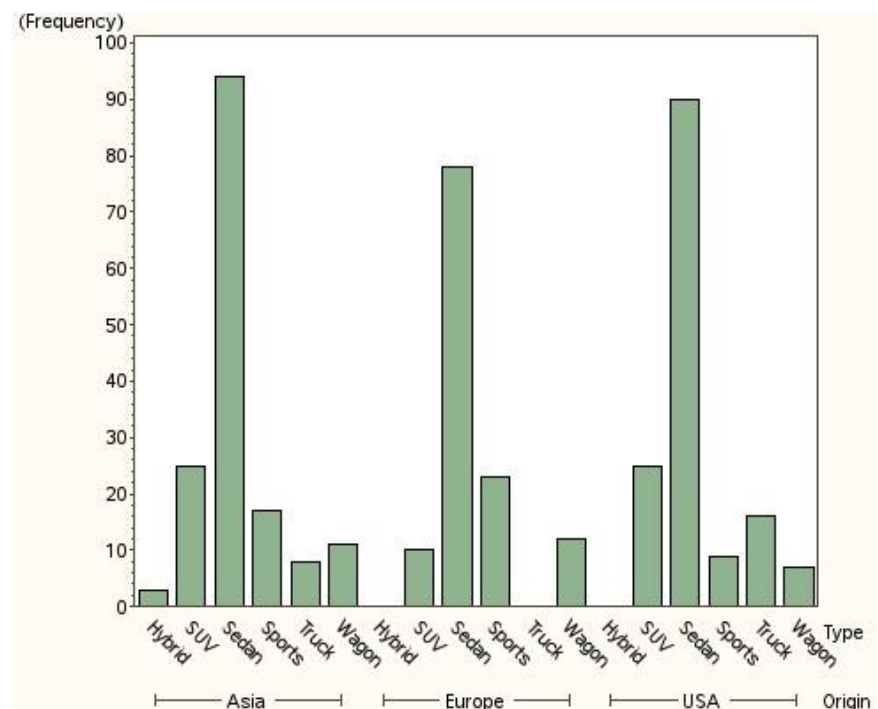


Colors By

For bar charts with "Group" or "Subgroup" variables, controls the color assignment pattern to the chart. The following chart displays a bar chart with "Group" variable and a color pattern of "Midpoints" which means that similar values in each group will have the same color:



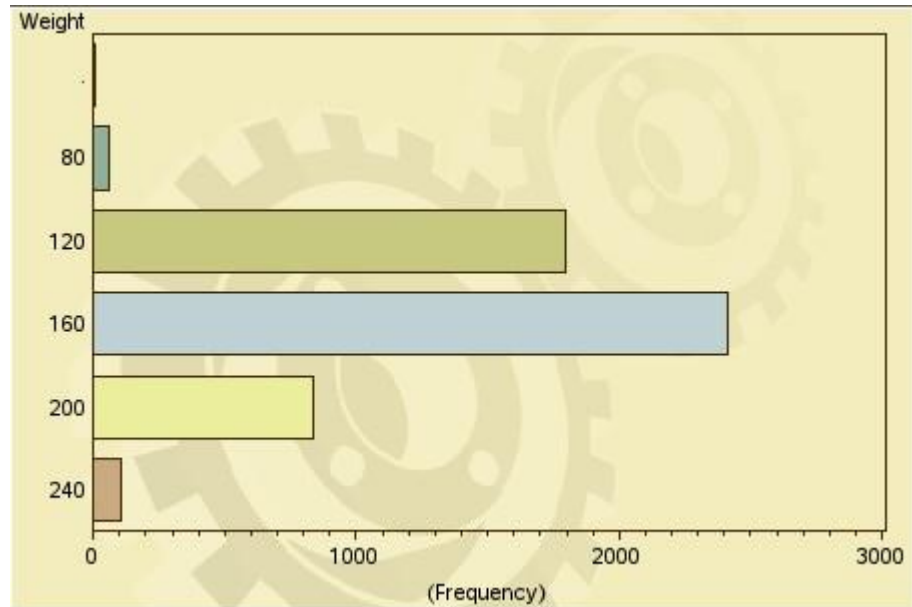
The same chart with "Color By" = "Groups" will create a chart with the same color for each group of bars as displayed in the following figure:



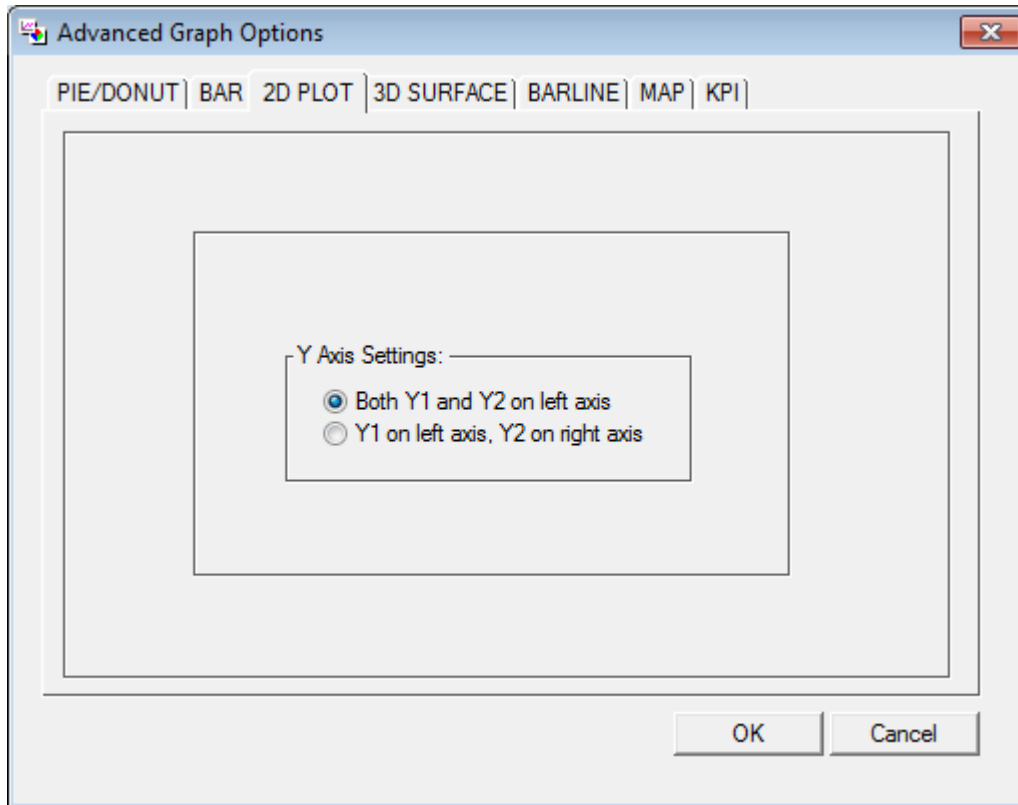
Note: bar charts with "SubGroup" variable will always result into charts with a different color for each bar section and a legend.

Data Type

"Discrete" data type will create a bar chart for each distinct value of the midpoint variable (default). If the midpoint variable is a continuous numeric variable (Eg. "Weight") then you can set the number of bars that will be displayed in the chart thus creating a "density" bar chart as displayed in the following figure:



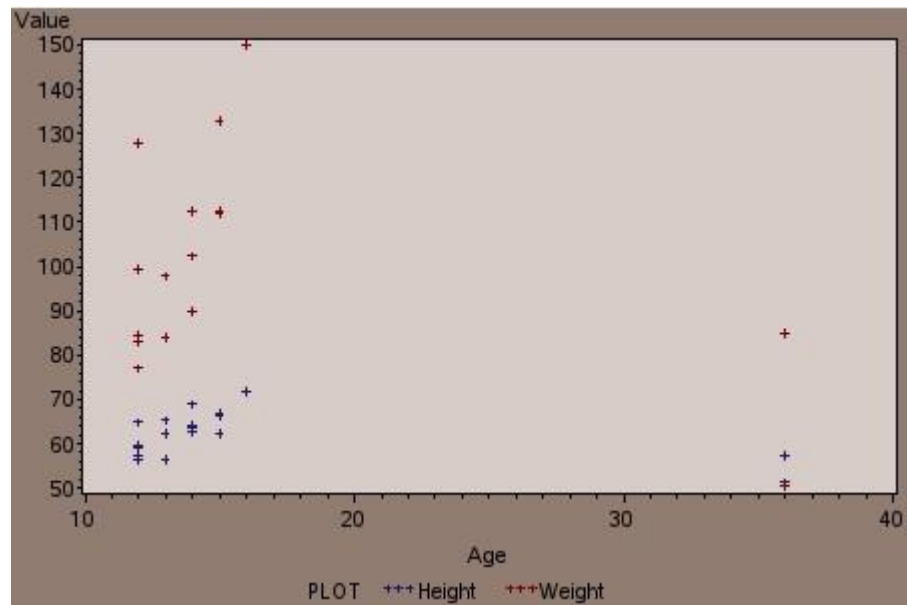
The 2D PLOT Tab



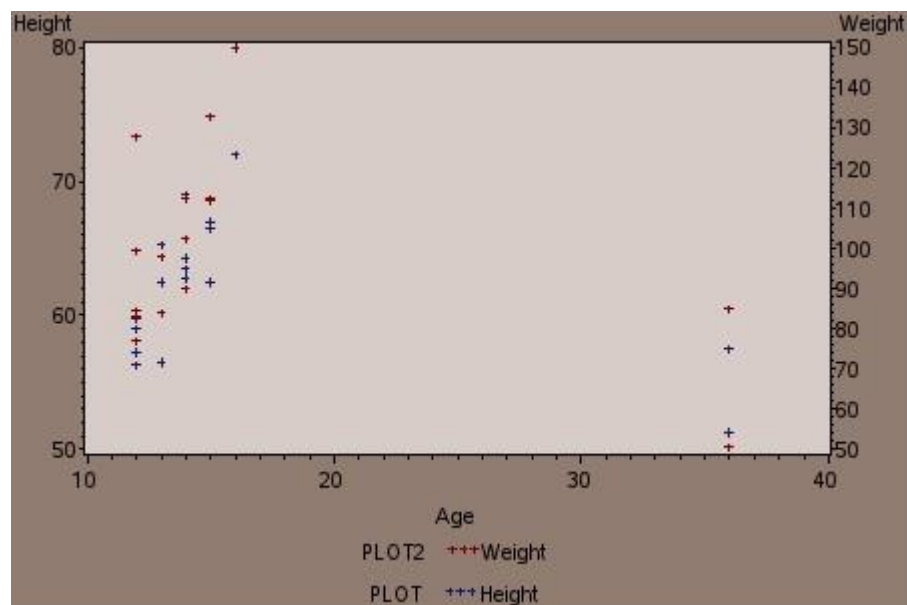
Y Axis Settings

If your plot has two Y axis variables, you can control the positioning of Y values on the chart as displayed in the following figures.

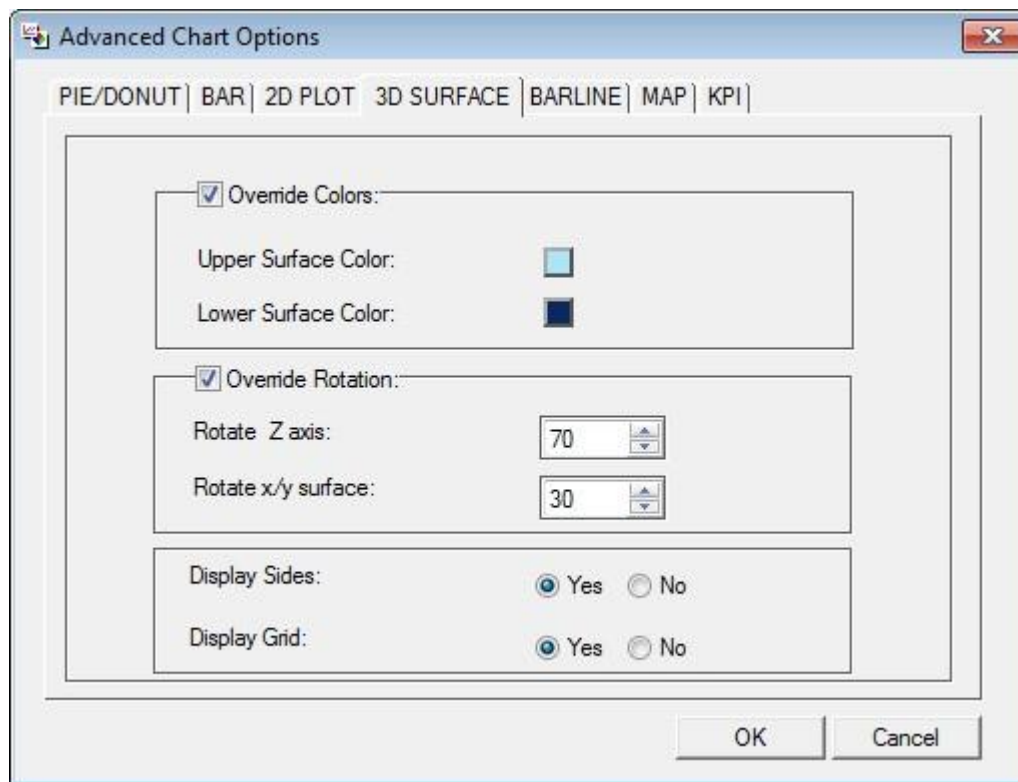
If you place both Y1 and Y2 on the left axis then the values of the axis scales to host min and max values of both variables and the label of the axis changes to "Value". Notice that a legend is automatically produces.



However, if you decide to place each Y variable on a different axis then the resulting chart with two "Y" different axes is displayed as in the following figure:



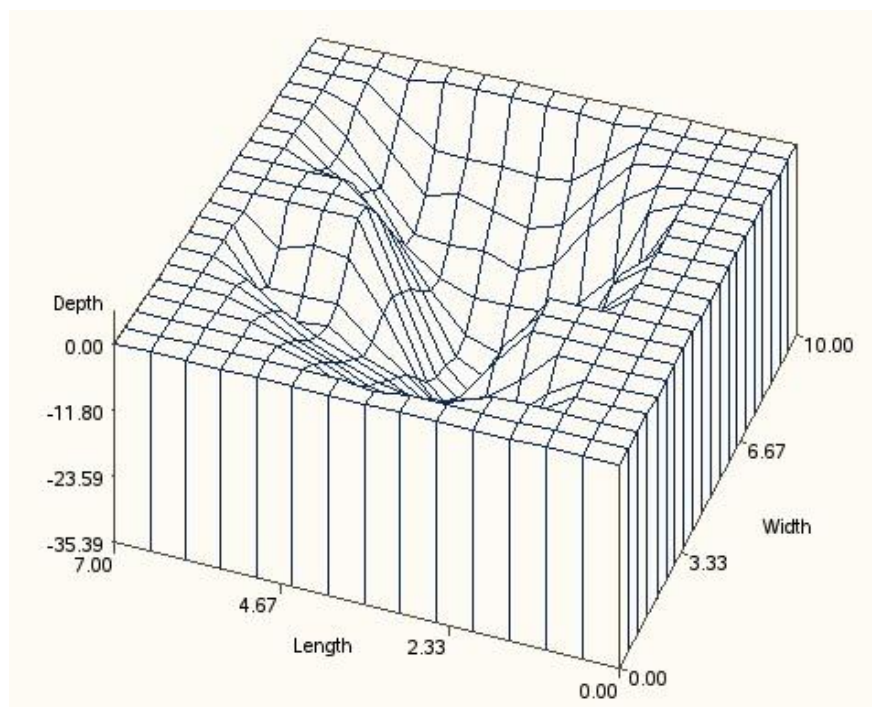
The 3D Surface Plot



Feature	Description
Colors	Overrides coloring inherited from the style definition.
Rotation	Overrides default positioning of the chart in 3D space by x/y/z rotation planes.

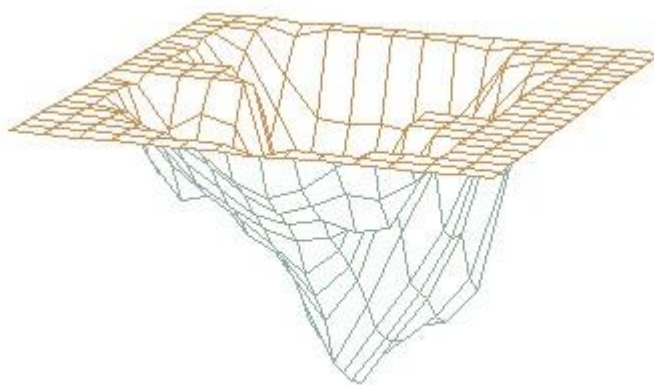
Display Sides

Display the 3D plot with sides as displayed in the following chart that shows the depth of a small lake: (Rotation implied)



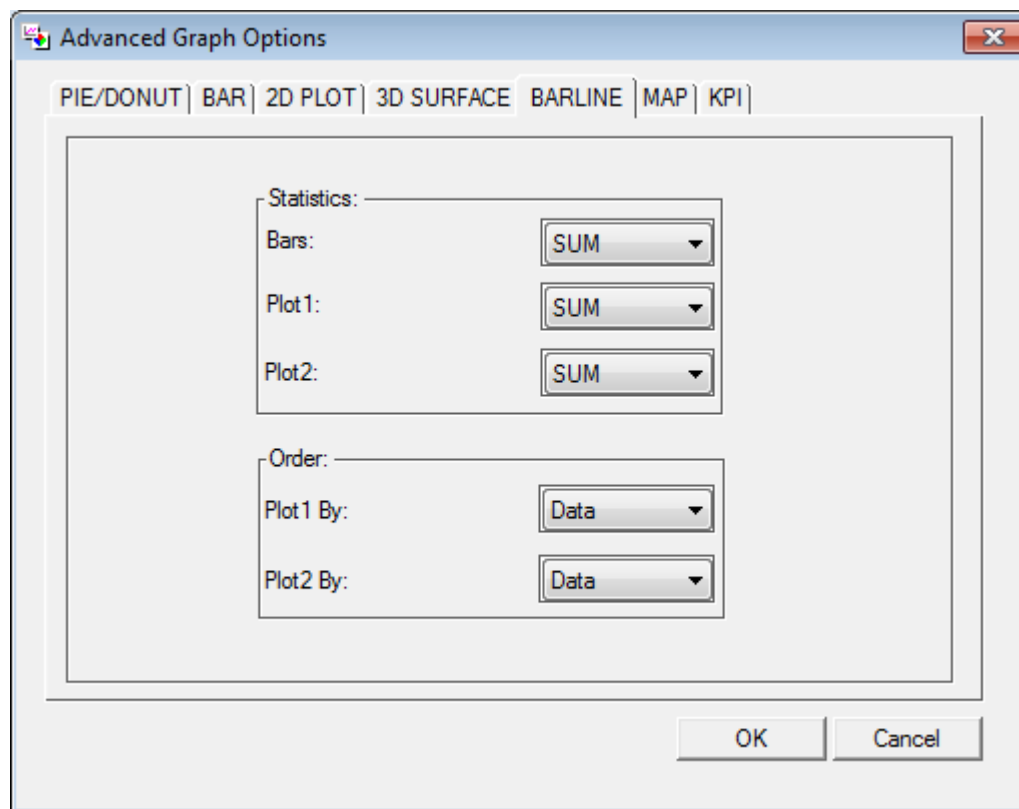
Display Grid

The same Sashelp.Lake data set shown without grid and from the default rotation angel:



The Barline Tab

Note: Some "Bar" characteristics of the chart are controlled via the "Bar" tab in the "Advanced Chart Options" window. The "Plot" characteristics of the chart are controlled via the "Axis" and "Line" tabs in the "Appearance" window.



Feature	Description
Statistics	The statistics assigned to each part of the barline. Sum statistics can only be selected if an analysis variable has been assigned to the chart.

Order

The order of midpoints of the bar is also the order of the Y axis points in the plot (default). This can be changed to produce more complex barline charts, for example, **Pareto** charts where the order of bars and plot are opposite.

PIE/DONUT | BAR | 2D PLOT | 3D SURFACE | BARLINE | MAP | KPI

Statistics:

Bars:

Plot1:

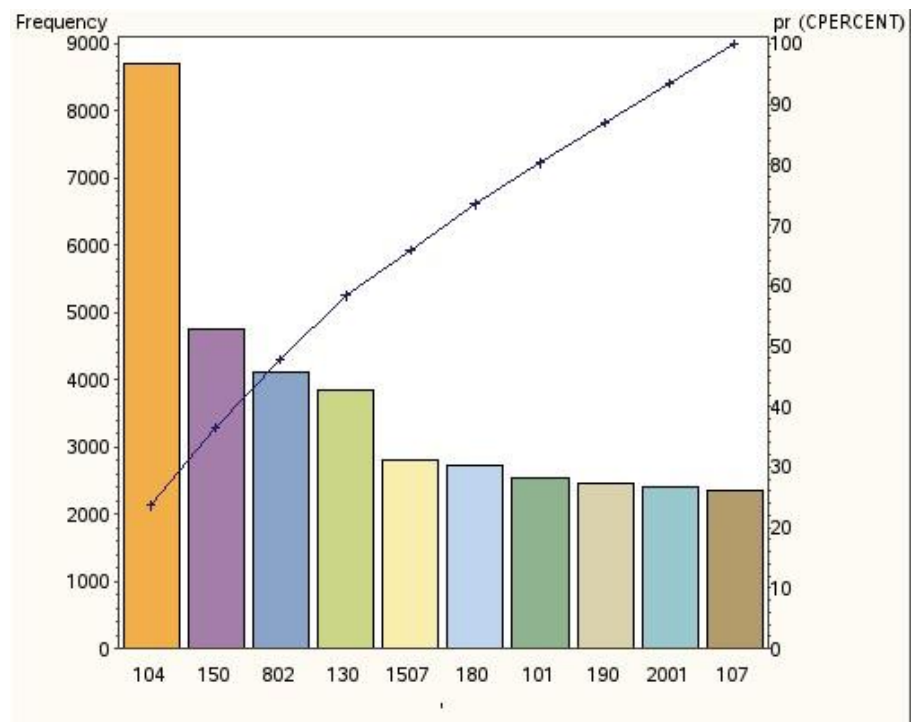
Plot2:

Order:

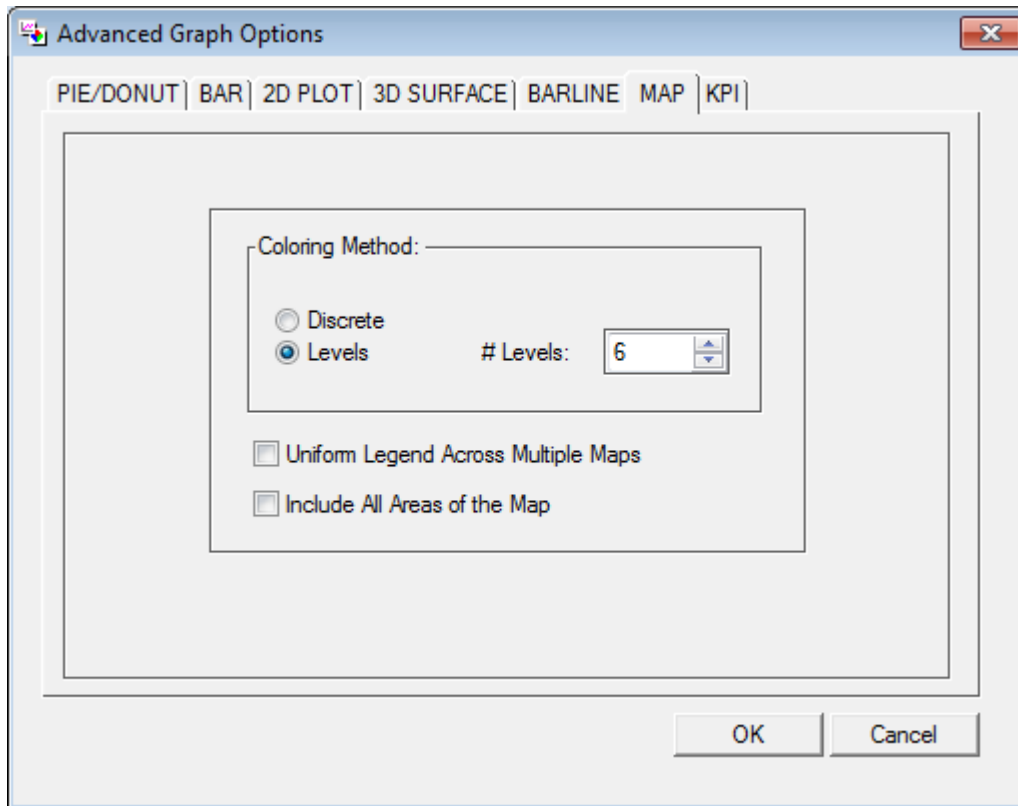
Plot1 By:

Plot2 By:

The statistics assigned to the bars is "Freq" where each bar represents the total number of incoming calls to a CRM call center by call type. The line represents the cumulative percentage of each bar up to 100%. the bars are ordered by descending order where the left most bar is the tallest bar while the points on the plot line are ordered in ascending order representing the ascending nature of cumulative percentage.



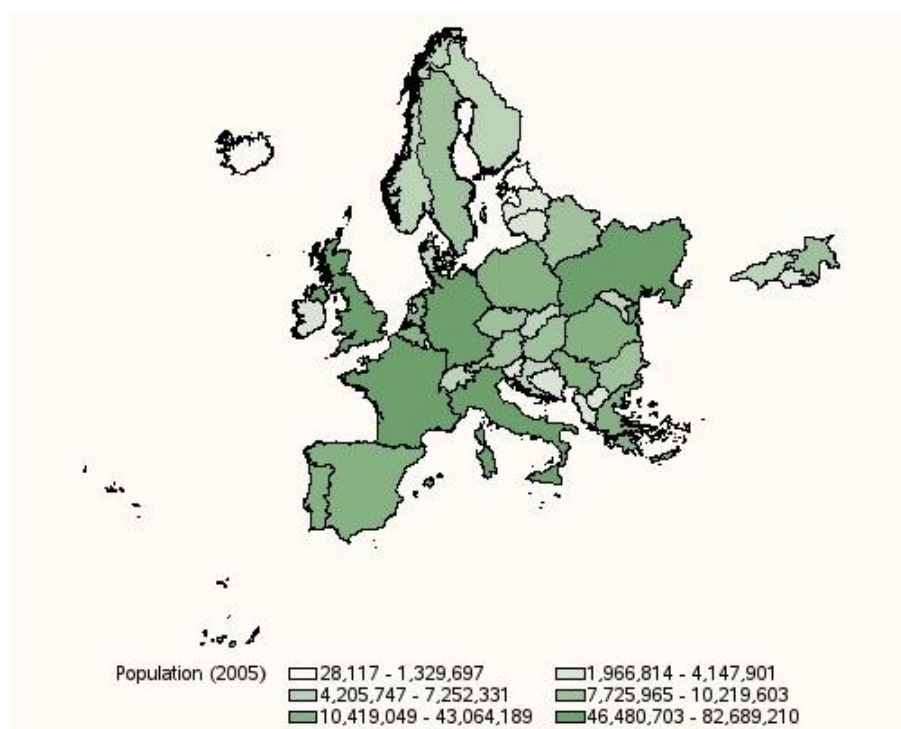
The Map Tab



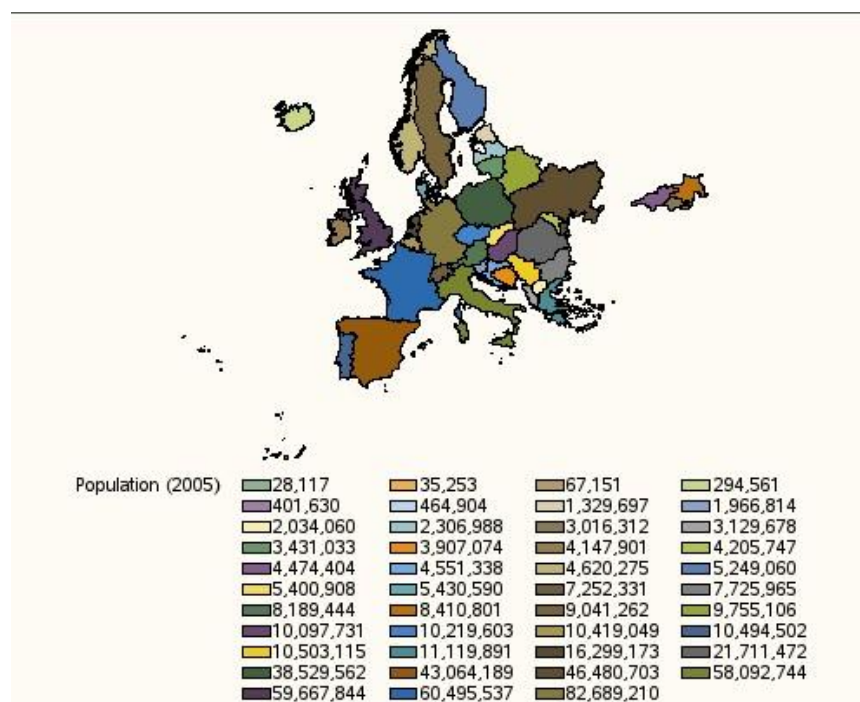
Coloring Method

The **"Discrete"** method will color each part of the map with a different color. The **"Levels"** method (default) will color each part of the map with a different color based upon its value which corresponds to one of the color levels created by dividing the range of values into the selected number of levels.

The following figure shows a map of Europe with "population" value divided into 6 levels thus every country is colored according to this schema:



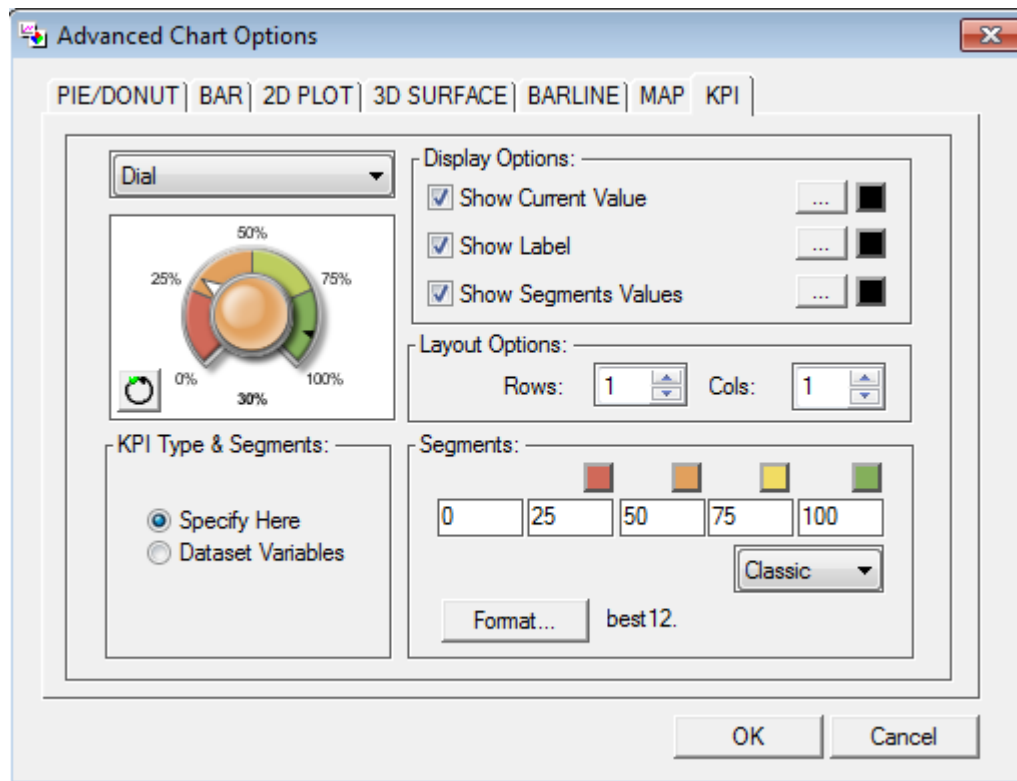
The following example shows the same map with "Discrete" coloring method (less useful):

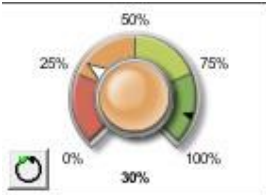
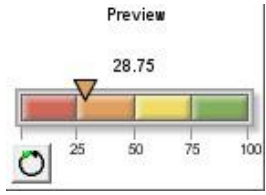
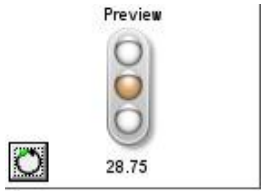
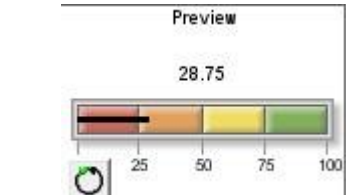


Uniform Legend	If a page variable has been selected then a separate map will be created for each value of the page variable. Selecting the "Uniform" option will ensure consistent legend and colors across all pages.
Include All Areas in Map	The map data set may contain areas which currently has no data in the data set. Usually this will cause that area not to be included in the chart (default).

The KPI Tab

Note: KPI charts may take longer to produce.



Feature	Description		
KPI Type	Several graphic designs are available to select from:		
	 Type 1 - Dial	 Type 2 - Half Speedometer	 Type 3 - Full Speedometer
	 Type 4 - Horizontal Slider	 Type 7 - Vertical Traffic Lights	 Type 8 - Horizontal Bullet

KPI Type & Segments

Select one of two methods to set KPI type and segments:

1. "Specify here" - use the settings in the window for each KPI. (A KPI is produced for each observation).

2. "Data set Variables" - KPI type and segments (borders and colors) are based upon specific variables with reserved names that must be in the data set along with the variable for the KPI value itself.

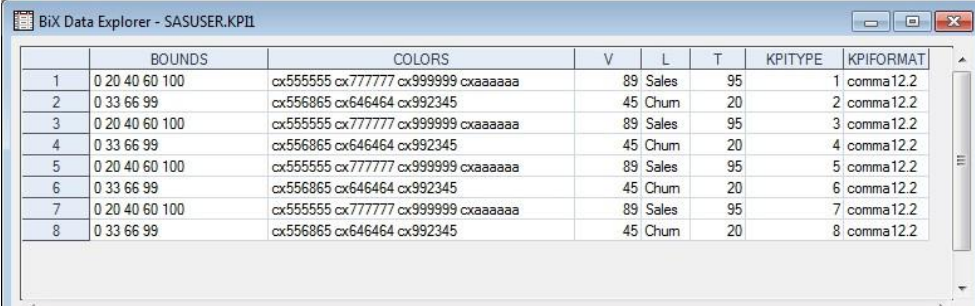
The reserved variables are as follows:

"BOUNDS" - Char \$100 variable which lists the borders of the segments as values separated by blanks.

"COLORS" - Char \$100 variable which lists the colors assigned for each segment separated by blanks. Each color is denoted by a prefix of 2 letters "cx" and a RGB color in hexadecimal notation in the range of 00-FF (Eg. "cxff0000" - for the "Red" color).

"KPITYPE" - a number between 1 to 9 representing the KPI type according to the relative positioning in the drop-down list in the window (1 - for "dial", 2- for "half speedometer" and so on).

"KPIFORMAT" - Char \$9 variable with the name of the format to use for displaying the KPI value.



	BOUNDS	COLORS	V	L	T	KPITYPE	KPIFORMAT
1	0 20 40 60 100	cx555555 cx777777 cx999999 cxaaaaaa	89	Sales	95	1	comma12.2
2	0 33 66 99	cx556865 cx646464 cx992345	45	Churn	20	2	comma12.2
3	0 20 40 60 100	cx555555 cx777777 cx999999 cxaaaaaa	89	Sales	95	3	comma12.2
4	0 33 66 99	cx556865 cx646464 cx992345	45	Churn	20	4	comma12.2
5	0 20 40 60 100	cx555555 cx777777 cx999999 cxaaaaaa	89	Sales	95	5	comma12.2
6	0 33 66 99	cx556865 cx646464 cx992345	45	Churn	20	6	comma12.2
7	0 20 40 60 100	cx555555 cx777777 cx999999 cxaaaaaa	89	Sales	95	7	comma12.2
8	0 33 66 99	cx556865 cx646464 cx992345	45	Churn	20	8	comma12.2

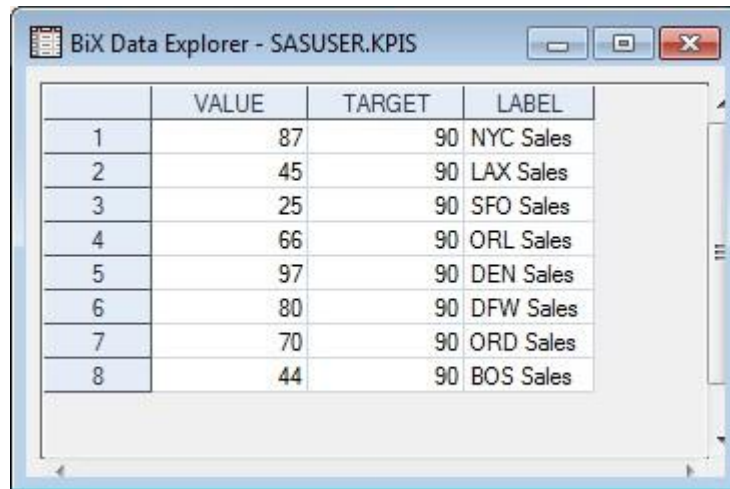
Notice that "bounds" variable will always have one more value than the "colors" variable.

In the above example the variable "V" is the value of the KPI, the variable "L" is the label and the variable "T" is the target variable. Both "L" and "T" are optional. A KPI for each observation is produced and each KPI will have its own bounds and colors.

Segments	If you have selected to specify segments "Here" up to four colored segments can be set with respective colors and bounds. Then Three segments can be specified by omitting the fifth value respectively. Segments values must match the possible values for the KPI. Usually KPI values and targets are scaled to present percentages values thus they are scaled from 0-100%. You can select a predefined style for the colors or set your own specific color for each segment.
Display Options	Control displaying of KPI values with their associated fonts and colors.

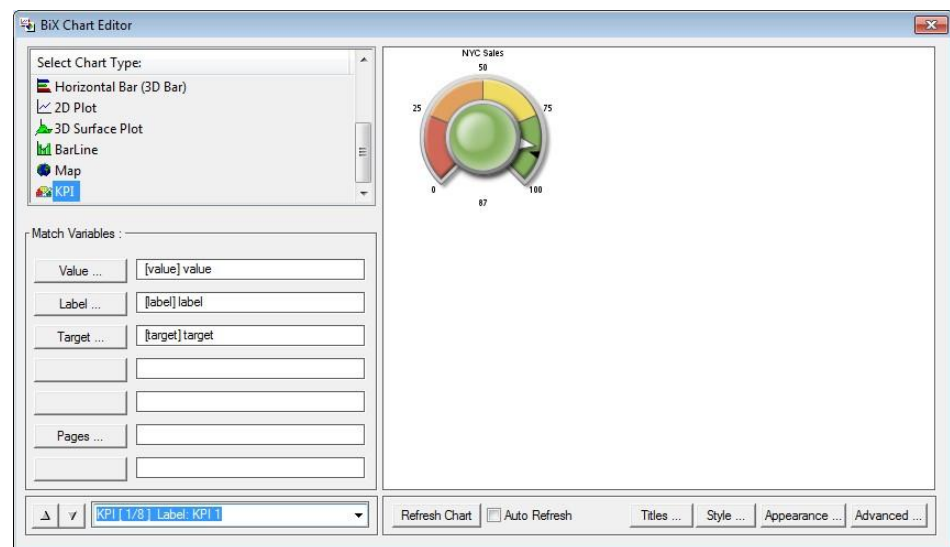
Layout

Controls the positioning of KPI charts in a dashboard. Dashboards usually contains several KPIs all grouped to form an executive dashboard. consider the following data set that contains KPI values and target of sales in different airports in the USA:



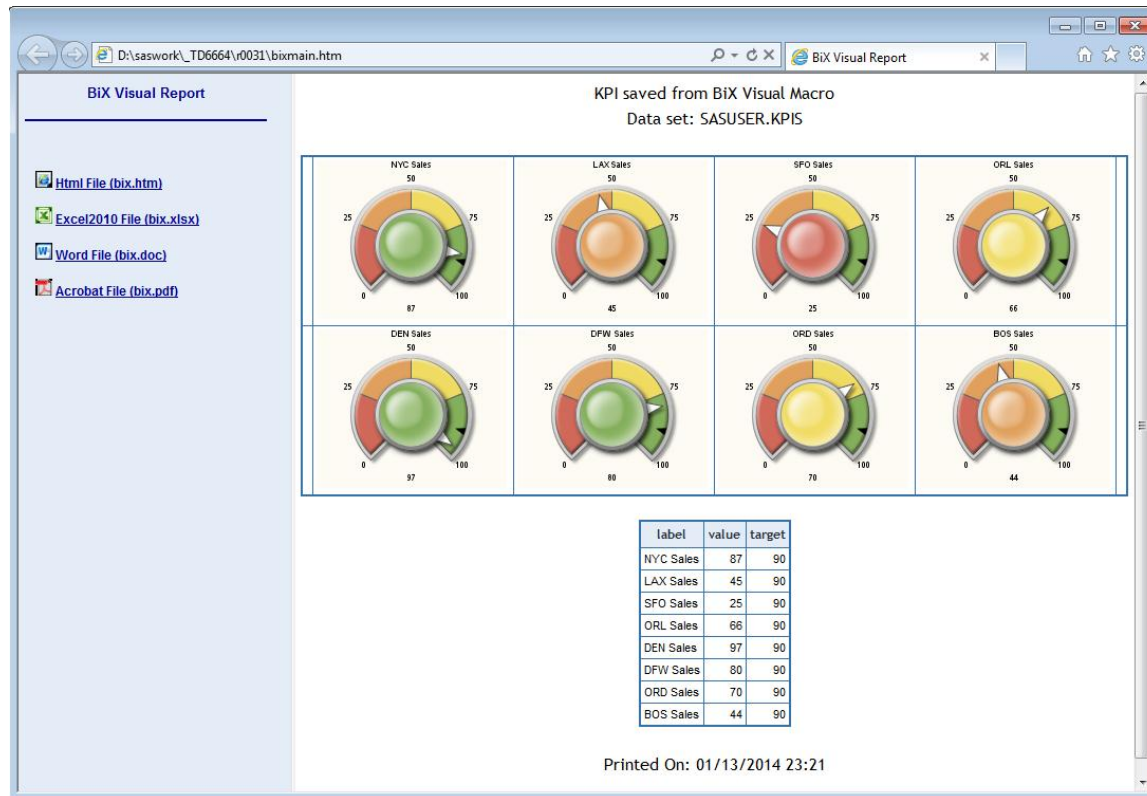
	VALUE	TARGET	LABEL
1	87	90	NYC Sales
2	45	90	LAX Sales
3	25	90	SFO Sales
4	66	90	ORL Sales
5	97	90	DEN Sales
6	80	90	DFW Sales
7	70	90	ORD Sales
8	44	90	BOS Sales

It is recommended to resize the chart area to a smaller size than the default (Eg. 180X150 pixels) in the "Appearance" window. producing the KPI chart in %Visual will show each KPI in a separate "page" and you can scroll down to view more KPIs:

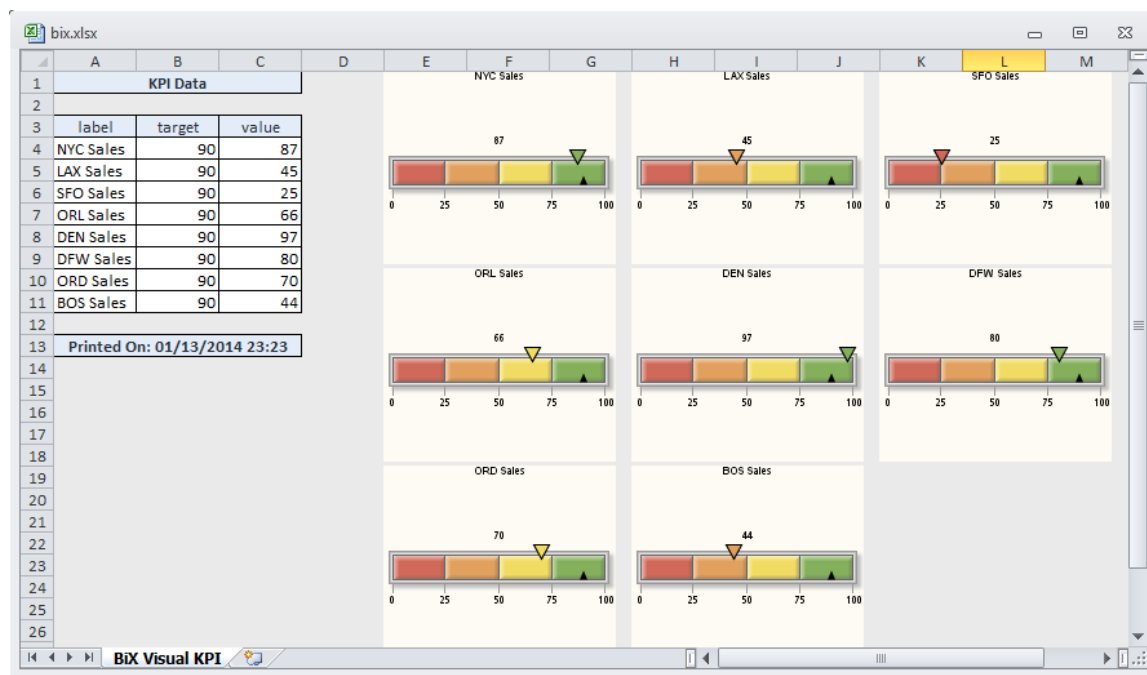


When the chart is exported as a "%Visual document" you can control the positioning of the KPI within the dashboard as in the following examples:

Example 1: Layout of 2 x 4 presented in HTML file:

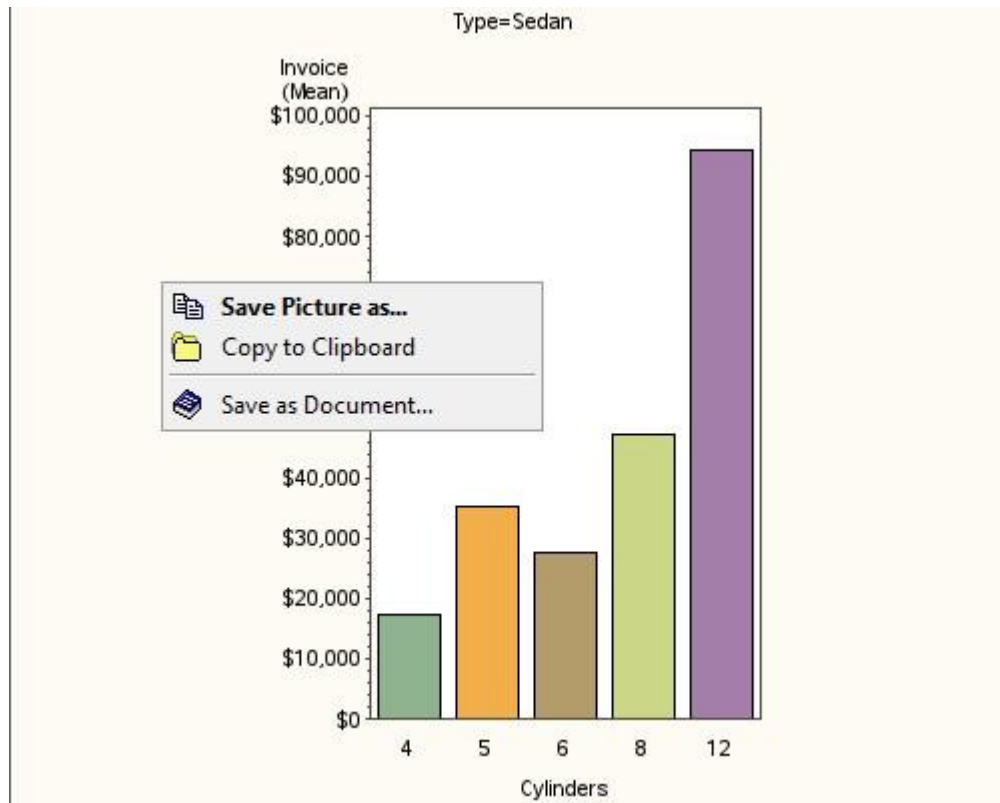


Example 2: Layout of 3 X 3 presented in Excel:

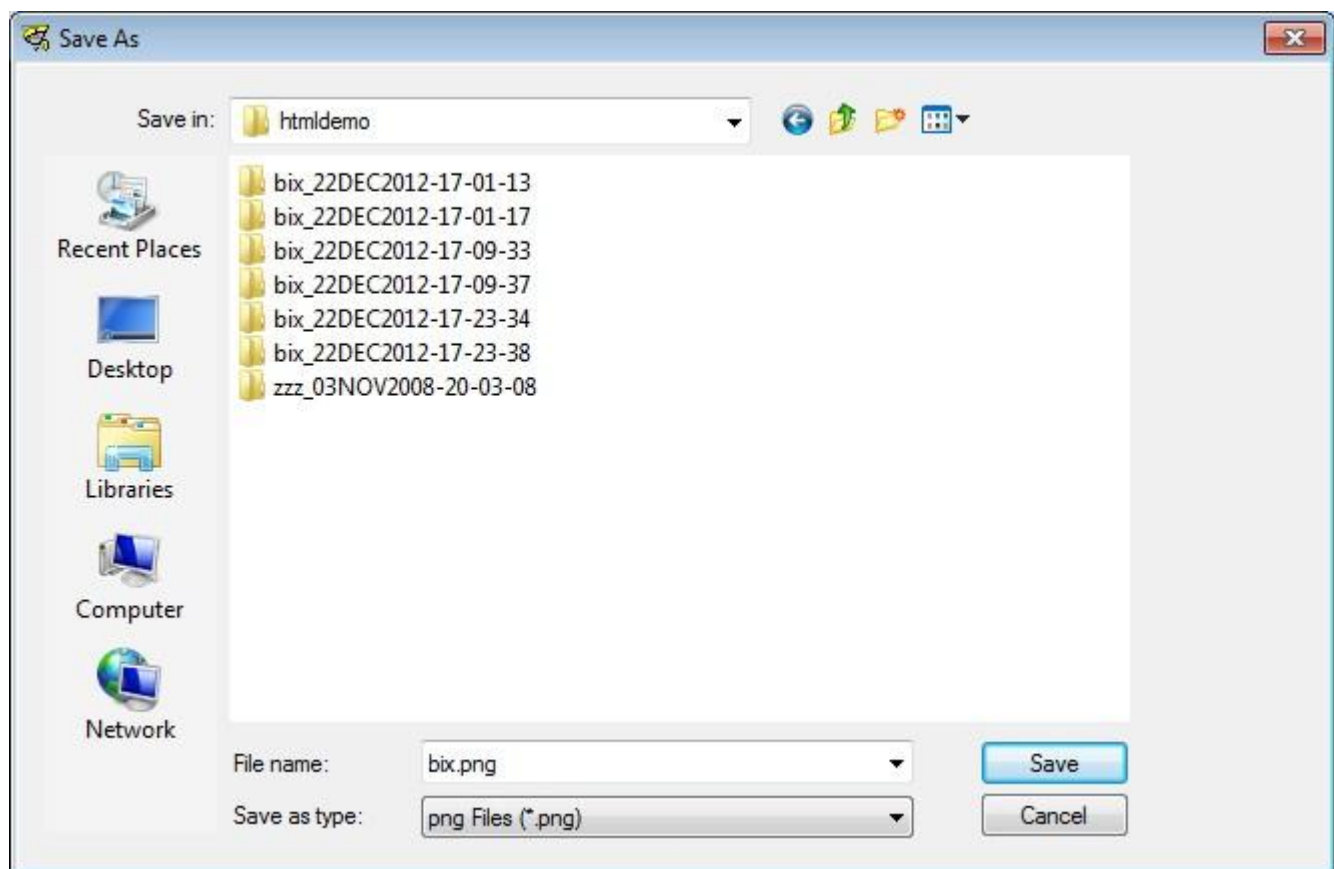


Additional Topics

Save Picture to a File



You can save the chart into a file on your system and later use it with any Windows compatible application that can display a png file.



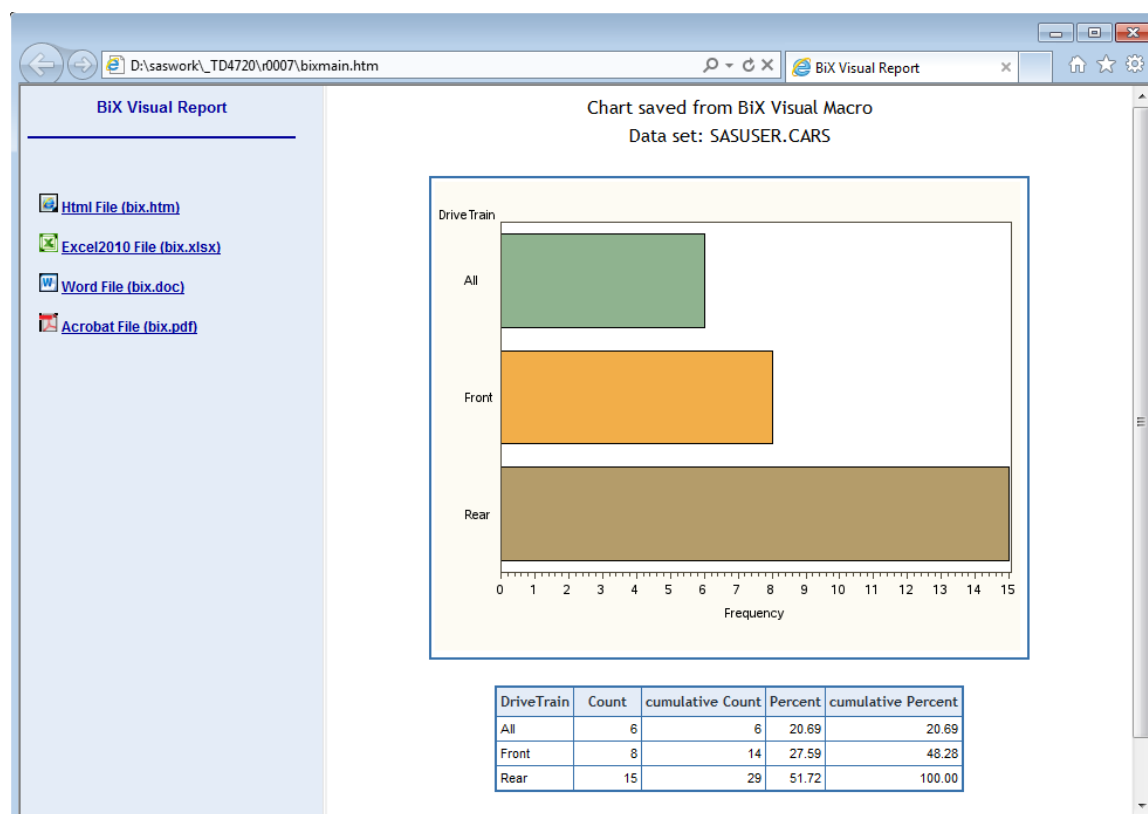
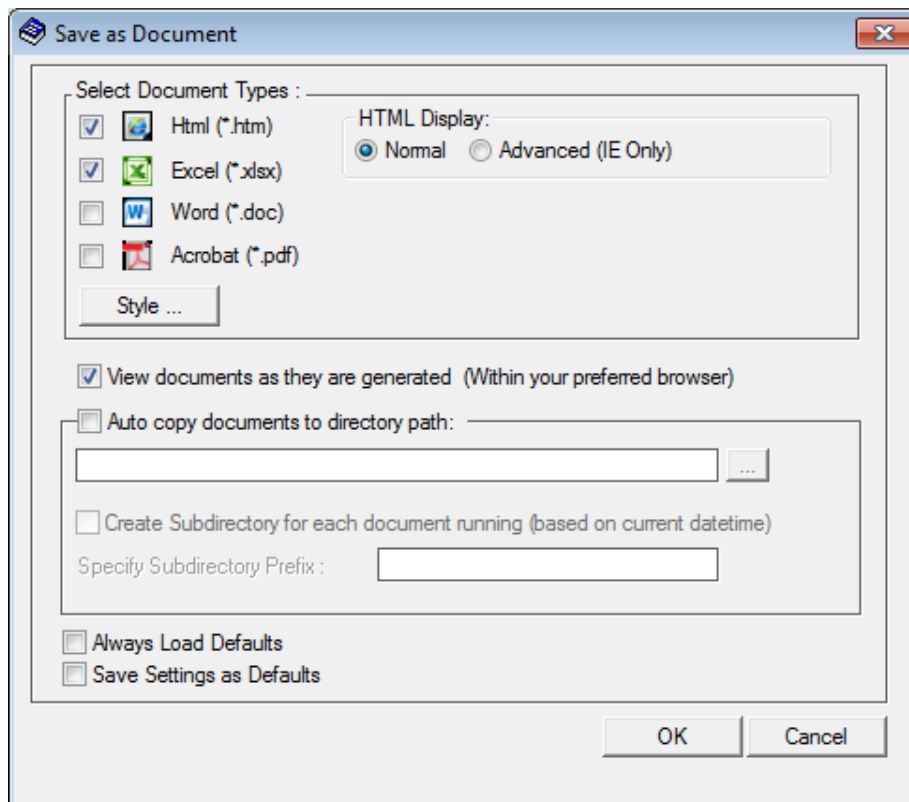
Copy Picture to Clipboard

Immediately copies the image from %Visual chart editor preview into your computer's clipboard where you can later paste the image into other Windows compatible application (Eg. MS PowerPoint).

Note: Works only with SAS for windows. Not applicable for SAS under Unix/Linux.

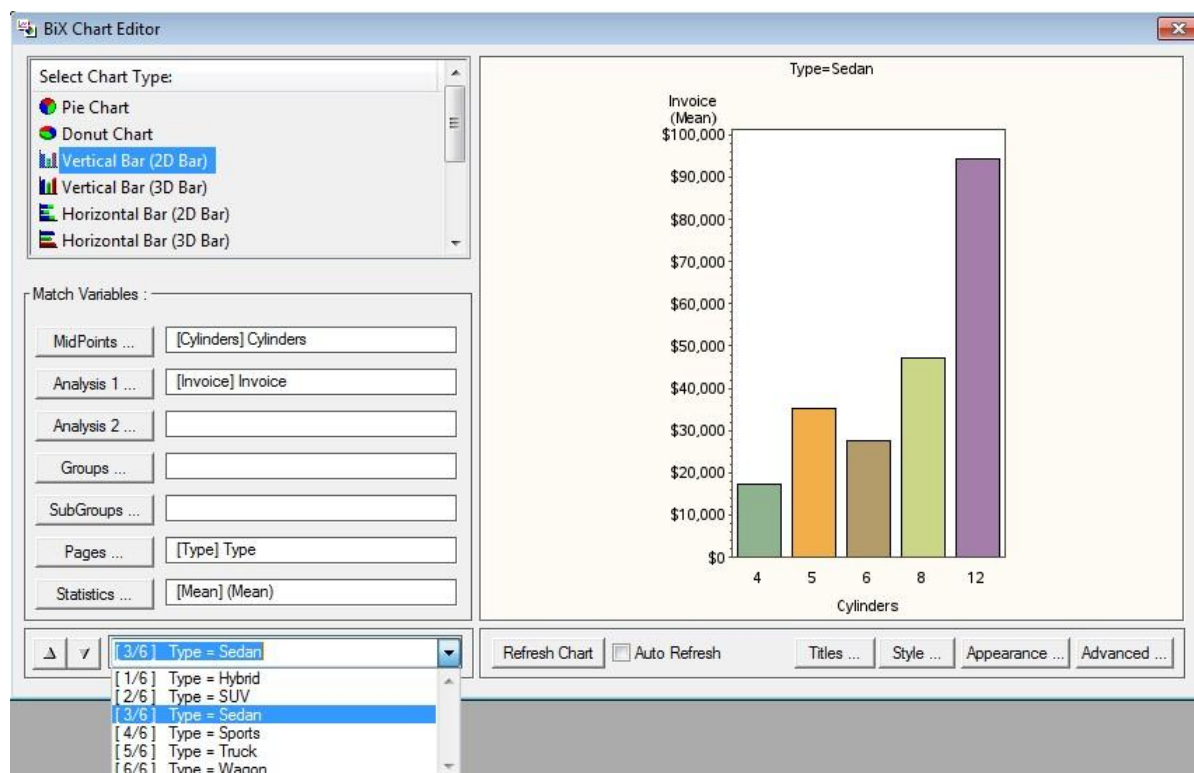
Save Picture(s) as Document

Sends the chart(s) to a document(s) of your choice. the HTML file will always be created with optional links to other file formats. the summarized data used to draw the chart is also printed inside the document.

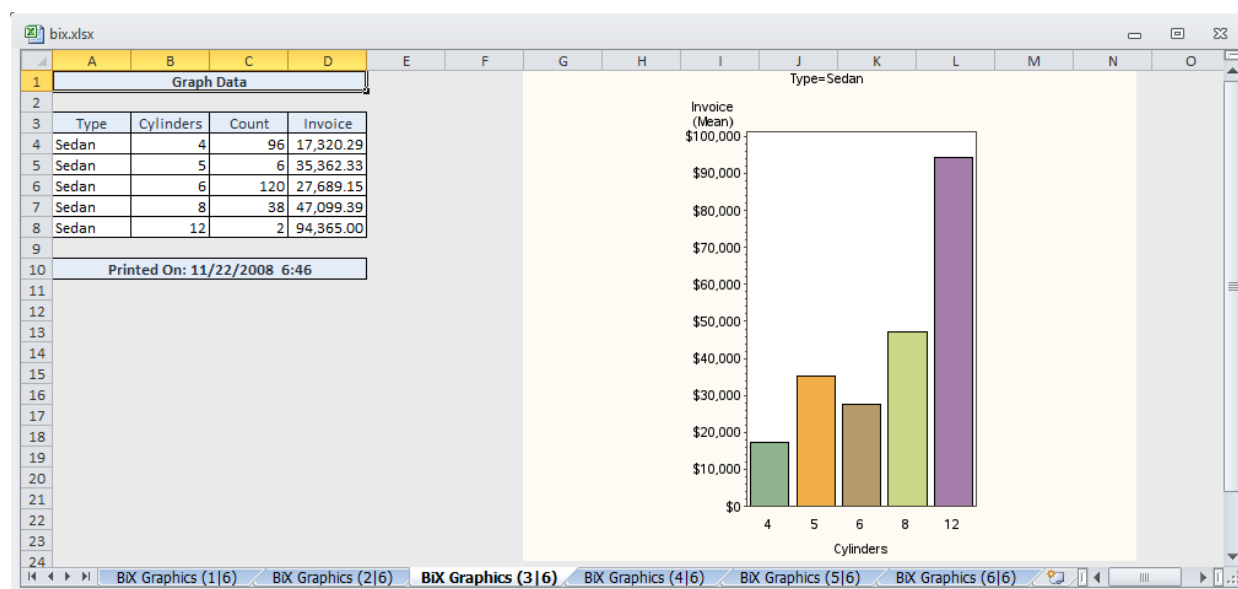


Charts with multiple pages

If you select a "Pages" variable then %Visual automatically creates a series of charts based on the values of the "Pages" variable. Each chart can be accessed using the "Next" or "Previous" push buttons or by using the pop menu which lists all created charts with their respective values. There is a limit of 999 charts that can be displayed. The "Next", "Previous" and the combo-box objects are only shown when you select a "Page" variable as shown in the following figure:



When you save a chart with multiple pages into a document, you get a HTML file with a contents part that allows you to select the chart. If you open the Excel2010 file, every chart is placed with its corresponding data in a separate sheet as shown in the following figure:



Simple Filter

Overview

Selecting A Simple Filter

Selecting Values in a Simple Filter

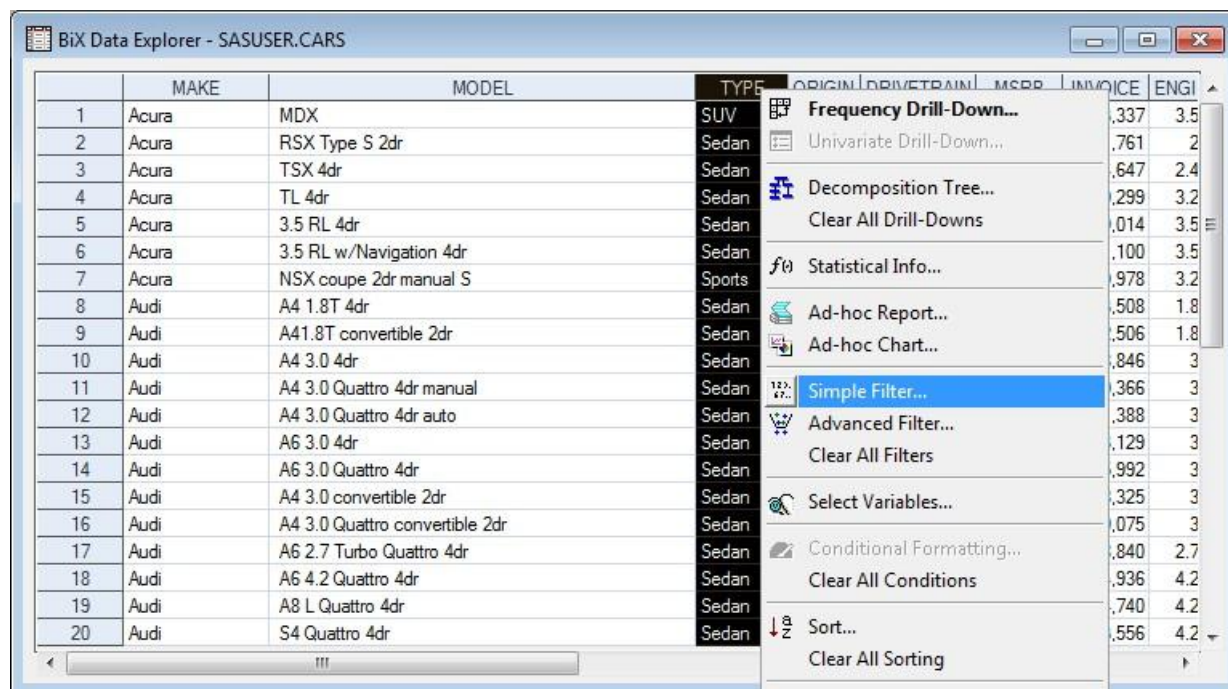
Viewing Simple Filters

Overview

One of the method %Visual offers to subset a data set (filtering its contents) is by Simple Filters. This method is very similar to filtering cells like in an Excel2010 spreadsheet. This is a very quick and straight forward method aimed for novice users and also if the complexity of the filter is limited. For more complex filters you can use the "Advanced Filter" method or the drill-down (Frequency and Univariate) methods or all of the three methods altogether.

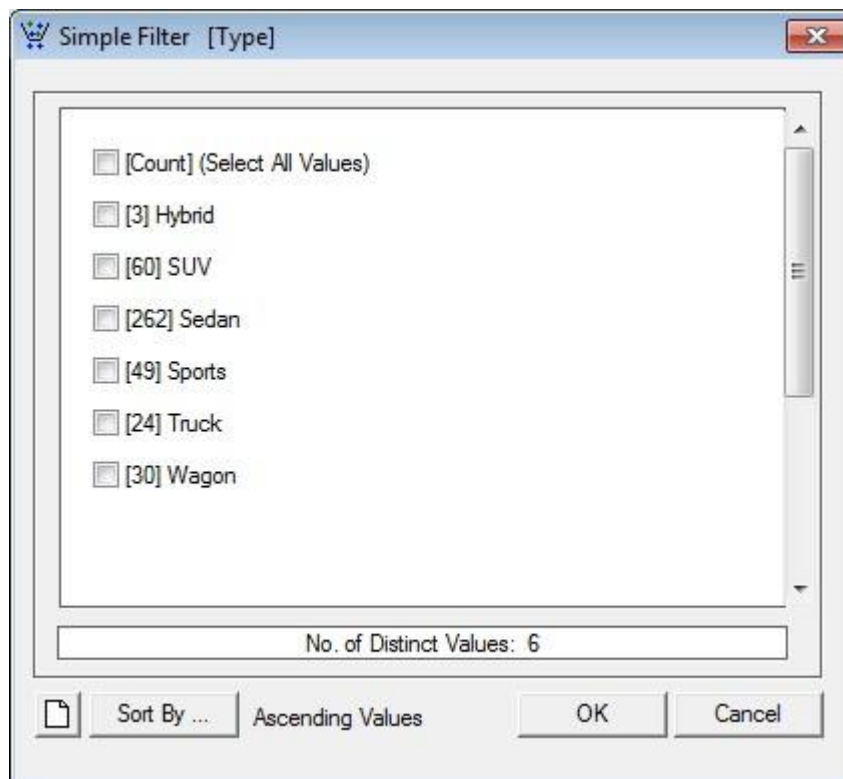
Selecting A Simple Filter

Highlight the variable that you want to filter and then select the "*Simple Filter...*" option from the pop menu as displayed in the following figure:



Selecting Values in a Simple Filter

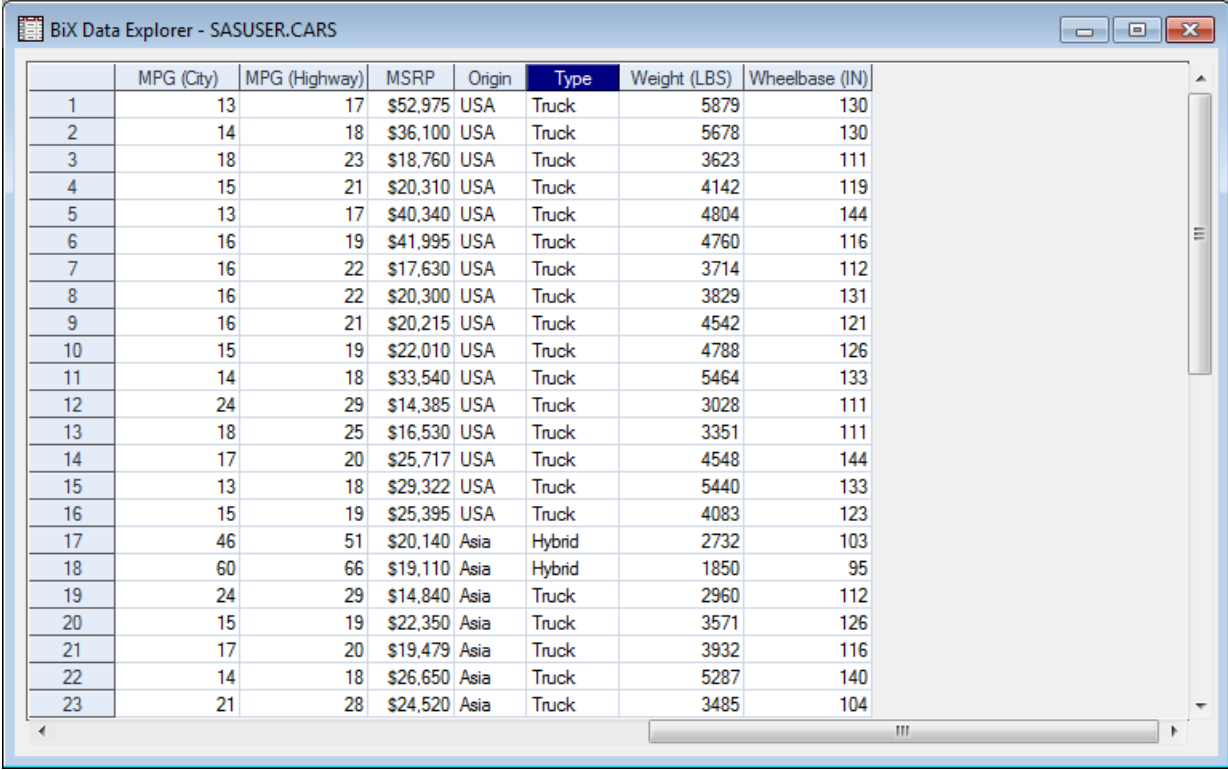
The Simple Filter window displays all possible unique values found in the column. Each value shows its count value in square brackets preceding the value itself. Simply select the values that match your need in a very similar way done in Excel spreadsheet filtering system.



You can sort the list by values or by count in ascending or descending manner. When you re-enter an already selected simple filter you are presented with the previous selected values but you can refresh the list of available values by clicking on the "Clear Filter" pushbutton.

Viewing Simple Filters

After returning to %Visual Viewer window, the filtered column changes its header color in order to show columns that have an active simple filter applied on them as shown in the following figure. (*Tip*: You can change the default color of a simple filter column as well as other colors implied on the table by selecting the "Viewer Attributes..." pop menu option).



	MPG (City)	MPG (Highway)	MSRP	Origin	Type	Weight (LBS)	Wheelbase (IN)
1	13	17	\$52,975	USA	Truck	5879	130
2	14	18	\$36,100	USA	Truck	5678	130
3	18	23	\$18,760	USA	Truck	3623	111
4	15	21	\$20,310	USA	Truck	4142	119
5	13	17	\$40,340	USA	Truck	4804	144
6	16	19	\$41,995	USA	Truck	4760	116
7	16	22	\$17,630	USA	Truck	3714	112
8	16	22	\$20,300	USA	Truck	3829	131
9	16	21	\$20,215	USA	Truck	4542	121
10	15	19	\$22,010	USA	Truck	4788	126
11	14	18	\$33,540	USA	Truck	5464	133
12	24	29	\$14,385	USA	Truck	3028	111
13	18	25	\$16,530	USA	Truck	3351	111
14	17	20	\$25,717	USA	Truck	4548	144
15	13	18	\$29,322	USA	Truck	5440	133
16	15	19	\$25,395	USA	Truck	4083	123
17	46	51	\$20,140	Asia	Hybrid	2732	103
18	60	66	\$19,110	Asia	Hybrid	1850	95
19	24	29	\$14,840	Asia	Truck	2960	112
20	15	19	\$22,350	Asia	Truck	3571	126
21	17	20	\$19,479	Asia	Truck	3932	116
22	14	18	\$26,650	Asia	Truck	5287	140
23	21	28	\$24,520	Asia	Truck	3485	104

You can assign simple filters to any variable(s). Each simple filter is a dynamic filter that shows the list of available values under the condition that all other filters are also applied to the data. (An advanced filter or drill-down settings may also apply to the list of shown distinct values).

Advanced Filter

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- Selecting Group of Values
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- Selecting values from an associated format table

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- Selecting Single Value

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- Selecting Single Date
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Time Variable

- Selecting Time Range

Datetime Variable

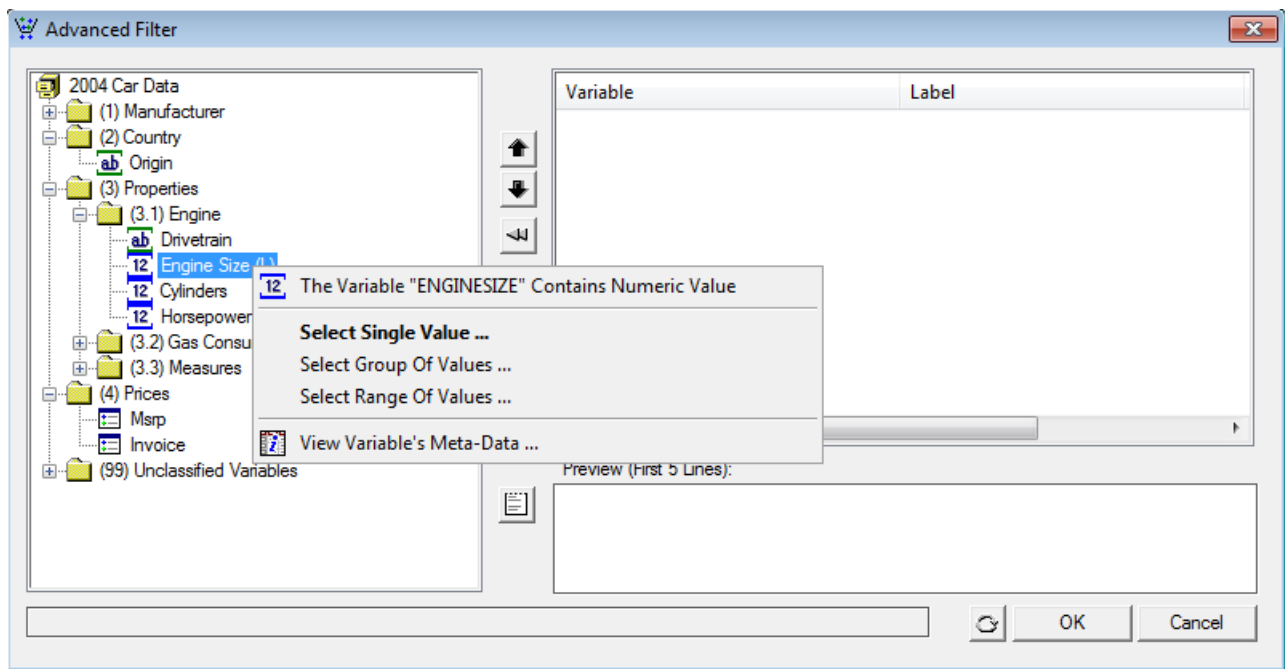
- Selecting Datetime Range

Additional Topics

- Editing a Clause
 - Building More Complex Filters with Logical operators
 - Adding Free Format Clause
 - Checking Your Filter
 - Viewing full SAS Where Code
 - Cycling previously defined clauses
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 - Combining Advanced filter with other filtering methods
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-

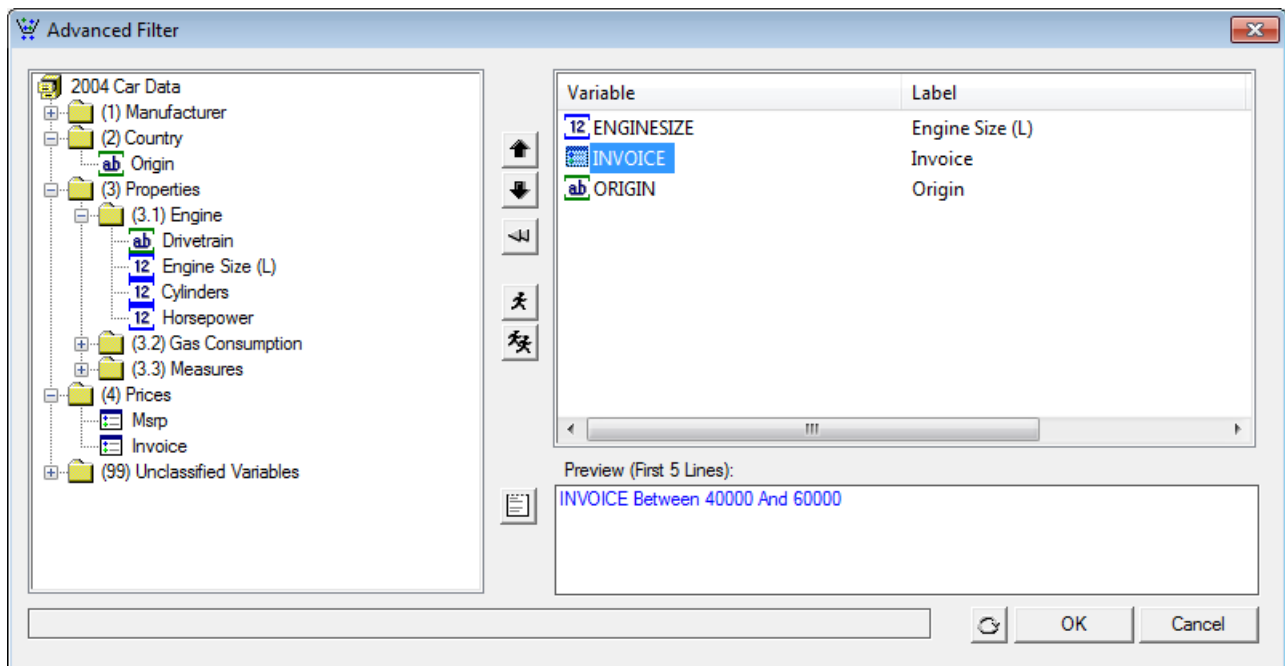
Overview

An advanced filter is a SAS "Where" clause that you can build through a series of wizards with the addition of logical connections (And, Or, Not) between them. The "Advanced Filter" window lets you choose values from the right wizard for each type of variable (For example, if the variable is of a "Date" type, then you are presented with options to select a date using a calendar instead of coding cumbersome SAS syntax like "12mar2012"d). Each variable in the data set can have a filter clause implied on it and the default logical connection between all selected clauses is "And". (No need to specifically write this "And" connection but you can select a different logical connection like "Or" and imply parenthesis if needed). You can also manually code a "Where Statement" within one of the wizards. The Advanced Window has numerous techniques to let you verify the correctness of your where clause as will be described in the following sections.



As shown in the example above, The left side of the window shows the variable list of the data set. Select a variable and then right-click your mouse to open a pop menu showing possible wizards for this type of variable. Select the option that best suits your need and complete the clause by filling and selecting option in this wizard.

After quitting the wizard, the clause will appear in the list of selected clauses on the right side of the window. Select another variable and repeat the process. You can select any number of variables each with a different clauses. All selected clauses will be shown on the right side as shown in the following figure. The default logical connection between all clauses is "And" (Although it is not shown on the window). You can change the default logical connection to "Or" or "Not" and add parenthesis as needed.



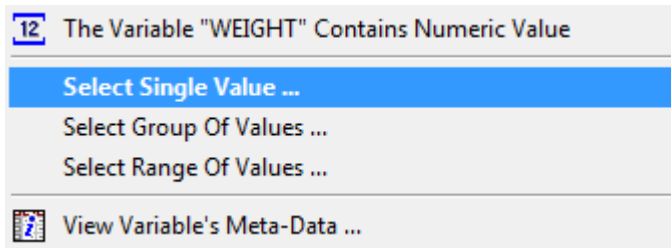
Note: If you click on one of the selected clauses on the right side of the window, the SAS "Behind the scene" generated code is displayed for this clause in the "Preview" section of the window.

Using macro variables in Advanced Filter windows

All advanced filter windows have an option to replace the value of a where clause in runtime with a macro variable value. Check this option and then supply the macro variable's name. You can assign values to the macro variables using standard SAS language statements (like %let).

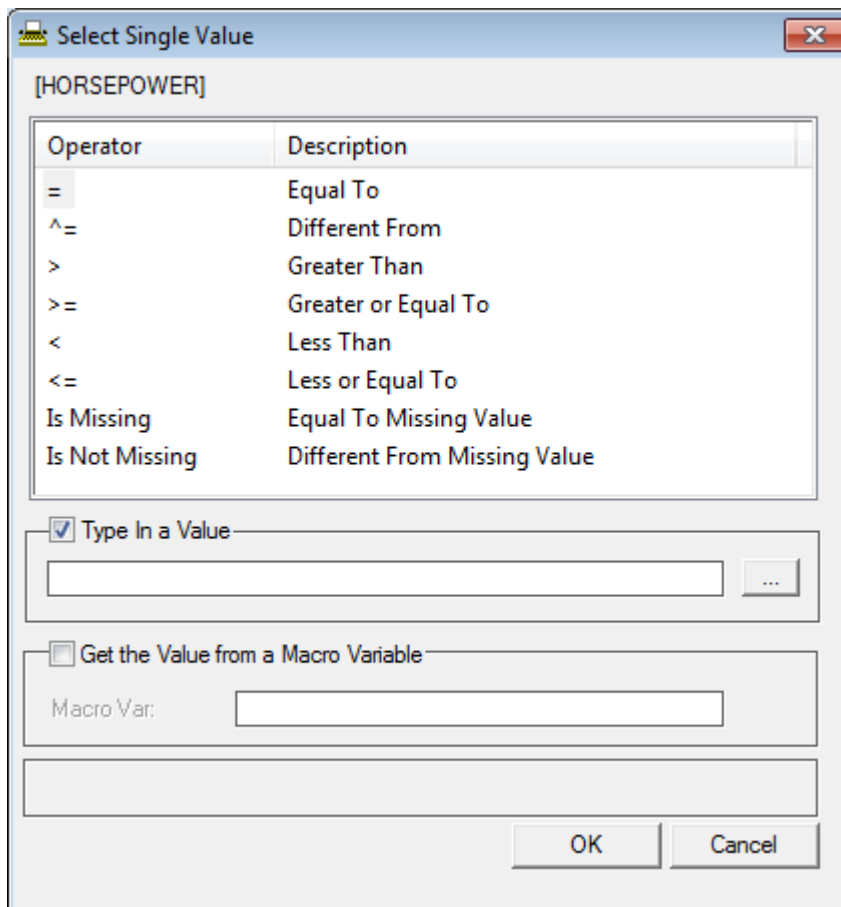
Numeric Variable

A numeric variable with no specific SAS format associated with it, will allow you to select from three possible wizards as shown in the following figure:

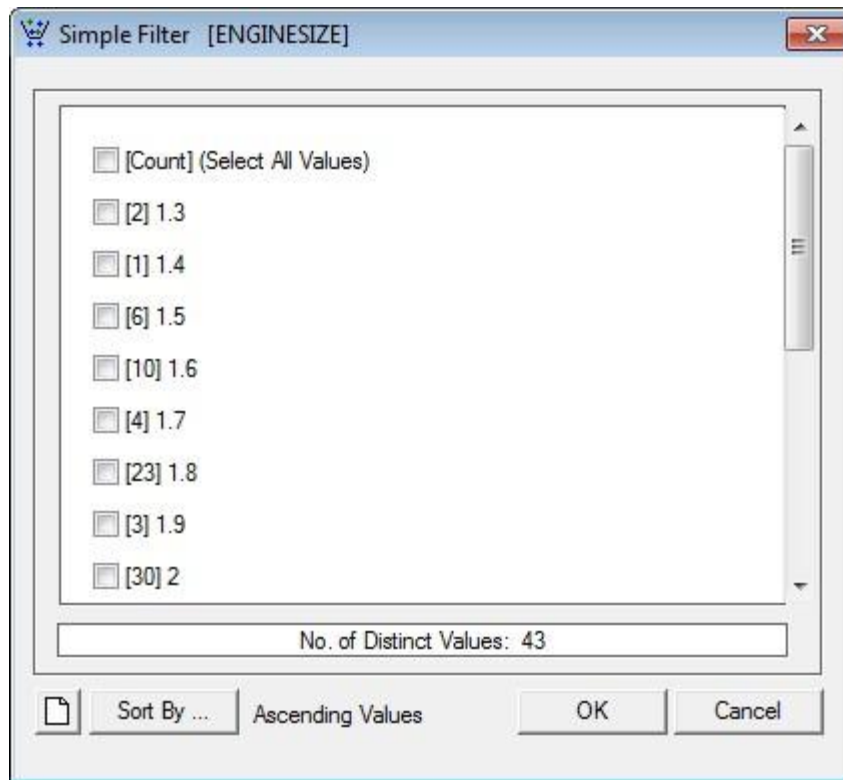


Selecting Single Value

Inside the "Single Value" window you should supply a single numeric value and a comparison operator selected from the list.



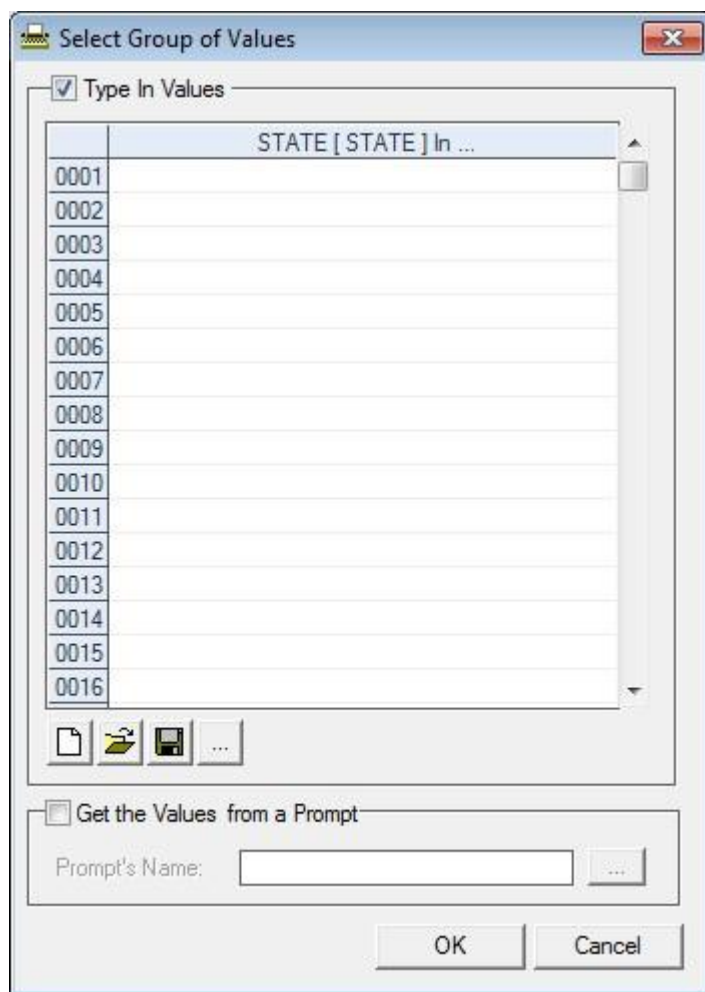
If the value is unknown to you, then you can ask %Visual to display the "Simple Filter" window that analyses "on the fly" all possible distinct values by pressing the "..." push button.



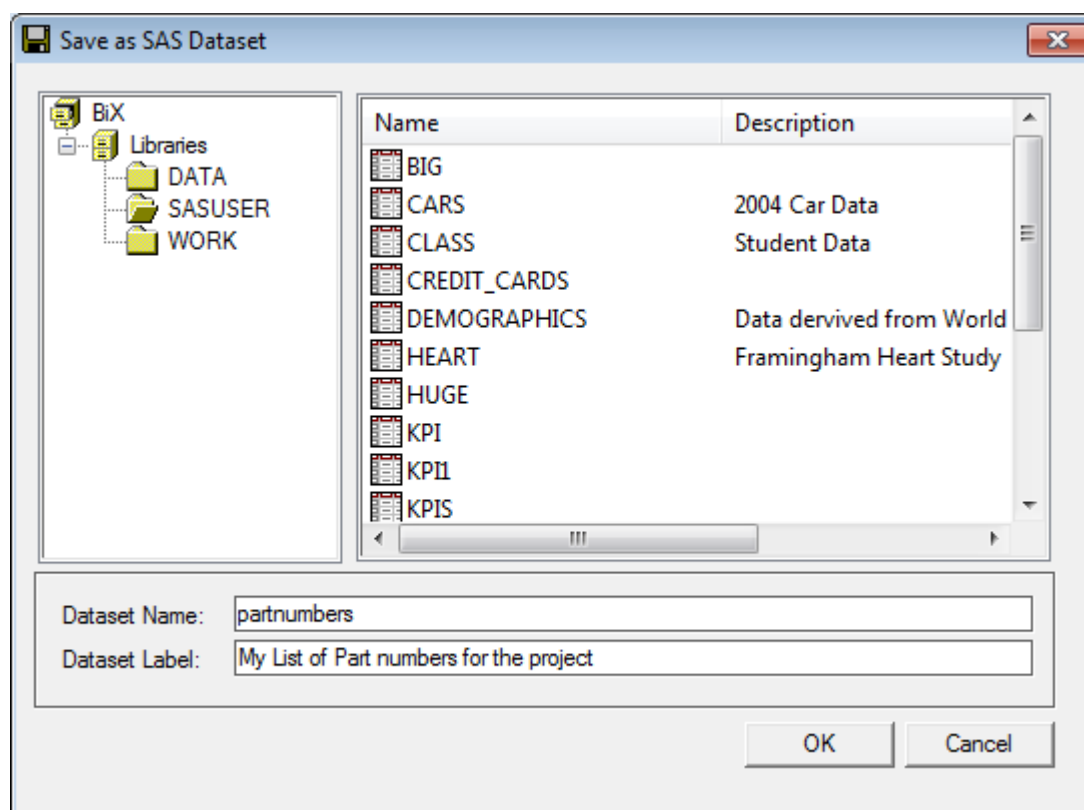
The first selected value from the "Simple Filter" window will be automatically pasted into the text entry object.

Selecting Group of Values

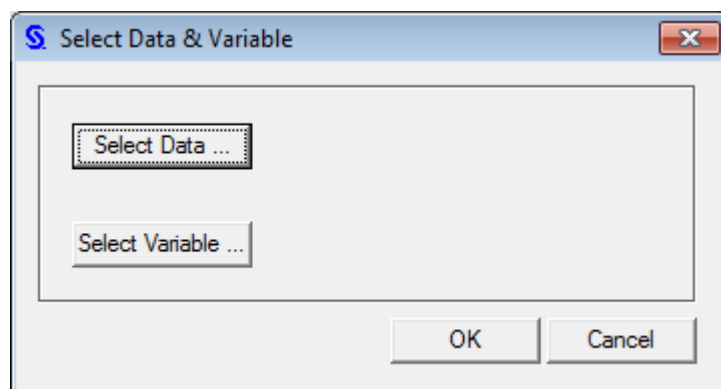
Sometimes a numeric variable holds numeric values like Customer numbers, SSID, Part numbers etc. If you like to specify a group of values then you can type them one by one in the "Select Group" window (Up to 9,999 values). This list of values then becomes a SAS where clause of the form "PARTNO in (3,6,8,9)".



Many times, these values lists are required for different reports and queries. In such cases, you can save the list to a SAS data set for future retrieval and maintenance. By pressing the "Save as SAS Data set..." push button, you can specify the name and location of the data set as shown in the following figure:

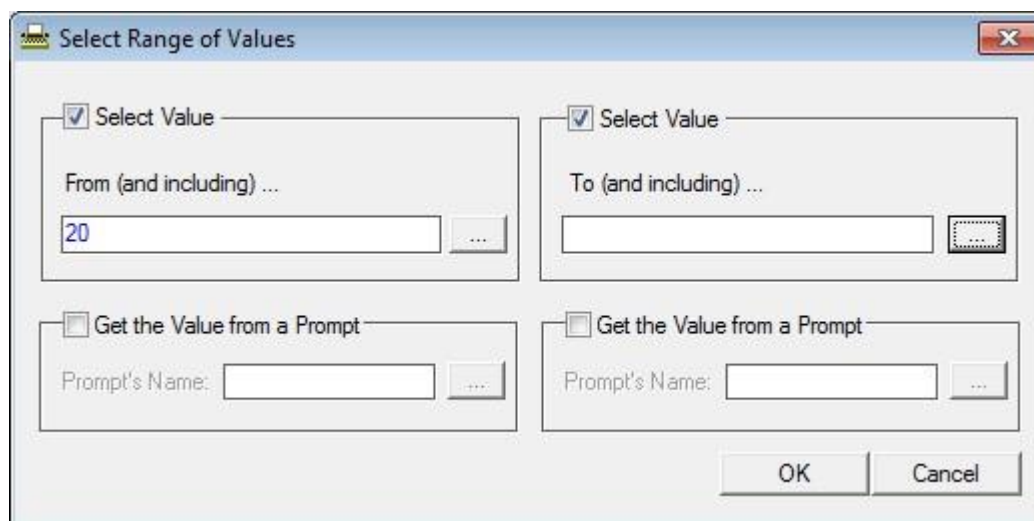


The saved SAS data set then becomes a repository for your saved list. Whenever you want to use the values stored in the data set, you can press the "Read from SAS data set..." push button, then select the data set and the variable that stores the values list as shown in the following figure. The values will be automatically pasted into the "Select Group" window. Thus saving the retyping process of this list. If values in the list has to be modified, then you can edit, add or delete values and save the list again.



Selecting Range of Values

For numeric variables, the "Select Range" window lets you type in two values that are eventually stored as a SAS "Between" operator. If you don't know in advance the values, then you can request %Visual to display the Simple Filter window for you by pressing the two "..." push buttons.

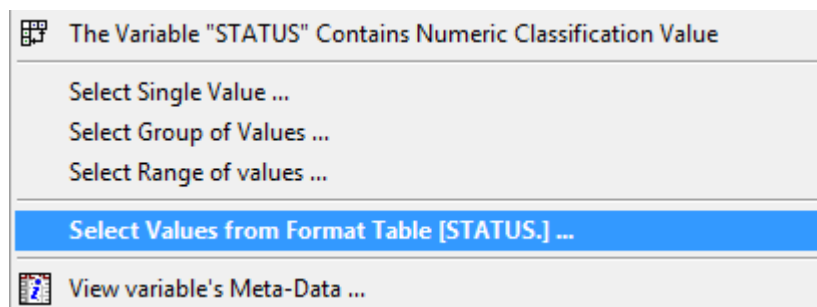


Numeric Analysis Variable

A numeric analysis variable has a SAS format associated with it that is on the formats: COMMAw.d or DOLLARw.d (and some others) mainly used for variables holding values like money values etc. In such cases, there are only two wizards available for you since the "Group of Values" window has no relevance for this type of variable.

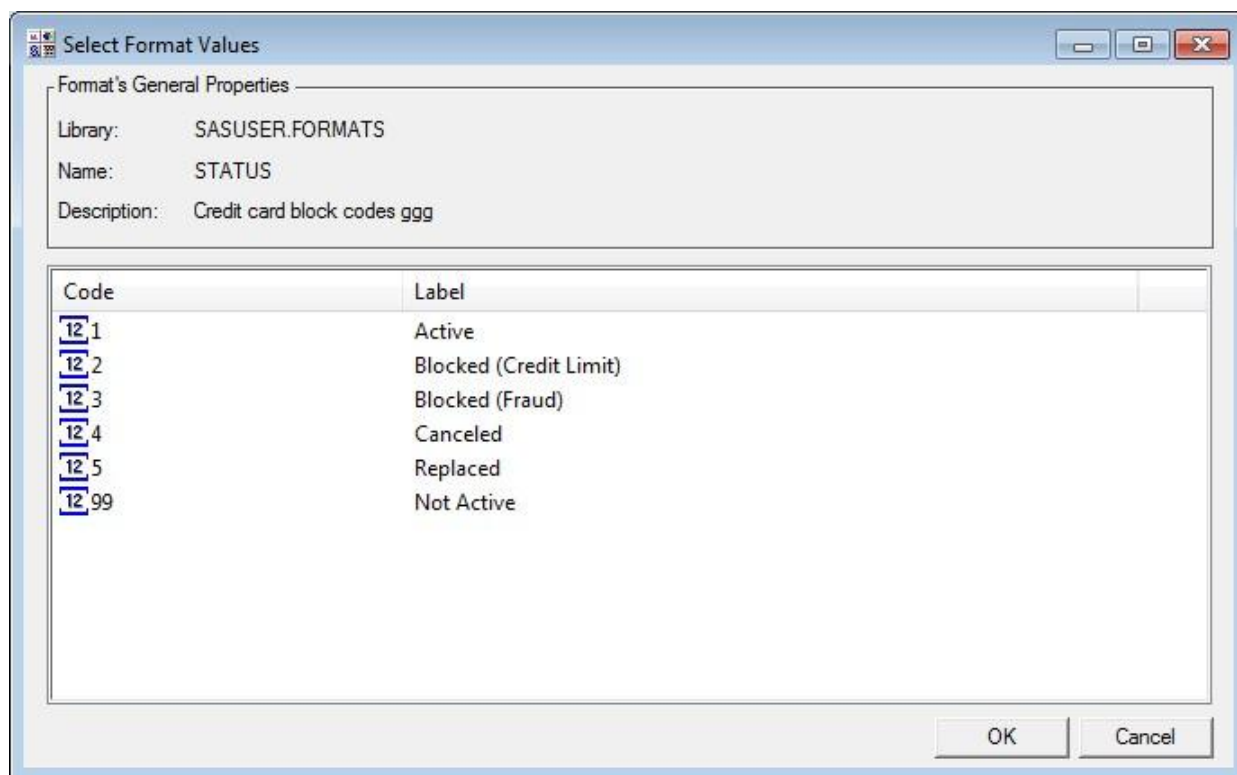
A Variable With User-Defined Format

If the variable has an associated user-defined format, then you can use this format to select the values from. This is a faster method then letting %Visual query the values "on the fly" as done in the "Simple Filter" window. Another difference between the Simple Filter method and the format method is that the simple filter only shoes those values that are currently in the data set, and the format method shows all possible values for this variable based on the external format table associated with the variable.



Selecting values from an associated format table

By selecting the "Select values from Format Table..." %Visual displays a window with all possible values assigned in the associated format. You can select one or more values (CTRL). This operation does not scan the actual data set and thus saves computing resources.



Note: A format value "***Other***" which may be found within a SAS user defined format cannot be used as a valid selected value.

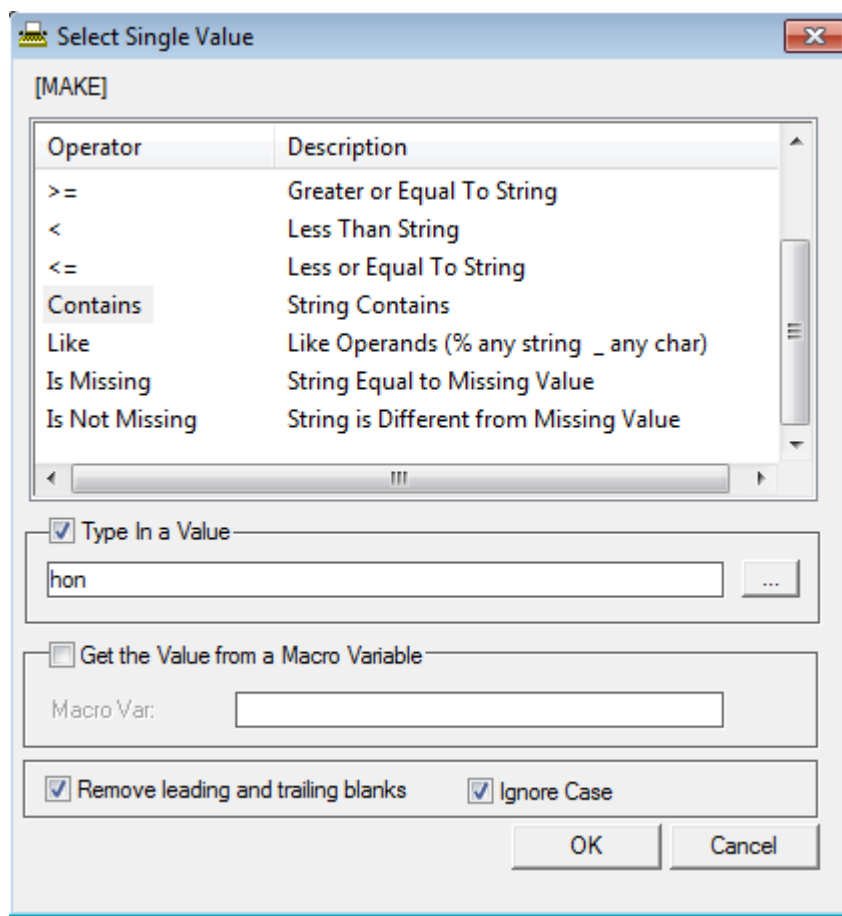
Note: The displayed format is the first one matching its name along the "fmtsearch" path assigned by SAS system option.

Character Variable

Selecting Single Value

The "Select Single Value" window has a broader set of operators than if the variable was a numeric one. You can use the "Contains" and "Like" operators to query character variables. Also, you can select the "Remove leading and trailing blanks" check box to overcome problems resulting from extra blanks at the data set or the "Ignore Case" check box to overcome problems resulting from case sensitive issues.

Note: you don't have to type quotation marks around the value because %Visual knows that this is a character variable and the quotation marks are added automatically.



Date Variable

A date variable is a numeric variable with a SAS date format associated with it. The underlying value of a SAS date value is the number of days since January, 1, 1960 which has the inner value of 0. Every date value before 01jan1960 is a negative number. This underlying structure of date values is hidden from the end user by %Visual windows.

Selecting Single Date

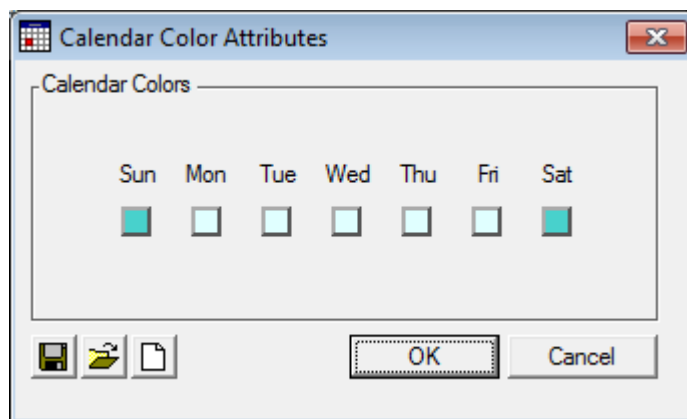
The "Select Single Date" window allows to select a comparison operator and a single date. Use the calendar object to select a specific date.

If the date value has to be a dynamic one, you can use the "Today()" push button which will build a dynamic clause which changes according to the current actual date, If you choose this type of date value, then the calendar is hidden as you can see in the following figure:

Selecting the "Other..." push button invoke a pop menu with some more often used advanced date values:

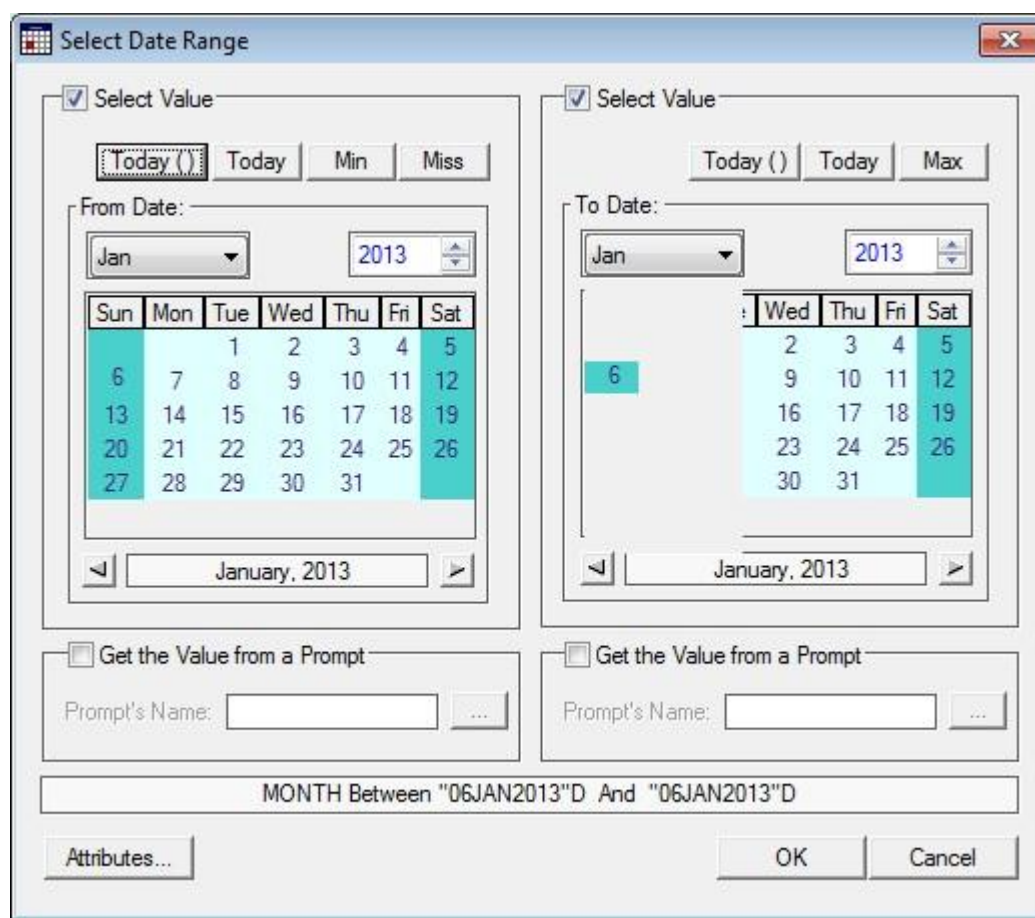
This Year Begin Date
Last Otr Begin Date
Last Otr End Date
Last Month Begin Date
Last Month End Date
This Month Begin Date
This Month End Date
This Otr Begin Date
This Otr End Date
Next Month Begin Date
Next Month End Date
Next Otr Begin Date
Next Otr End Date
This Year End Date

The "Attribute" window can change the colors of week days displayed in the calendar object:



Selecting Date Range

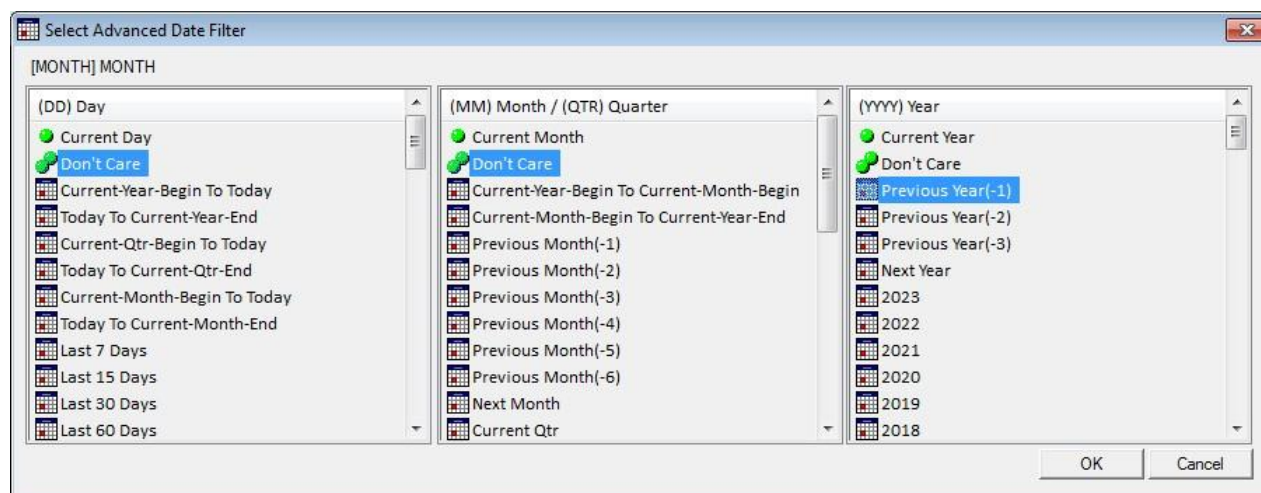
Date ranges can be set using the following window. Push buttons are similar to those in the Single Date window.



The "Select Date Range" dialog box is used to define a date range. It features two main sections for "From Date" and "To Date". Each section includes a "Select Value" checkbox, a "Today ()" button, and a "Today" button. Below these are dropdowns for the month (currently "Jan") and year (currently "2013"). A calendar grid is displayed for each section, with the date "6" selected in the "From Date" section. At the bottom, there is a checkbox for "Get the Value from a Prompt" with a text field for "Prompt's Name". The final output is displayed as "MONTH Between '06JAN2013'D And '06JAN2013'D".

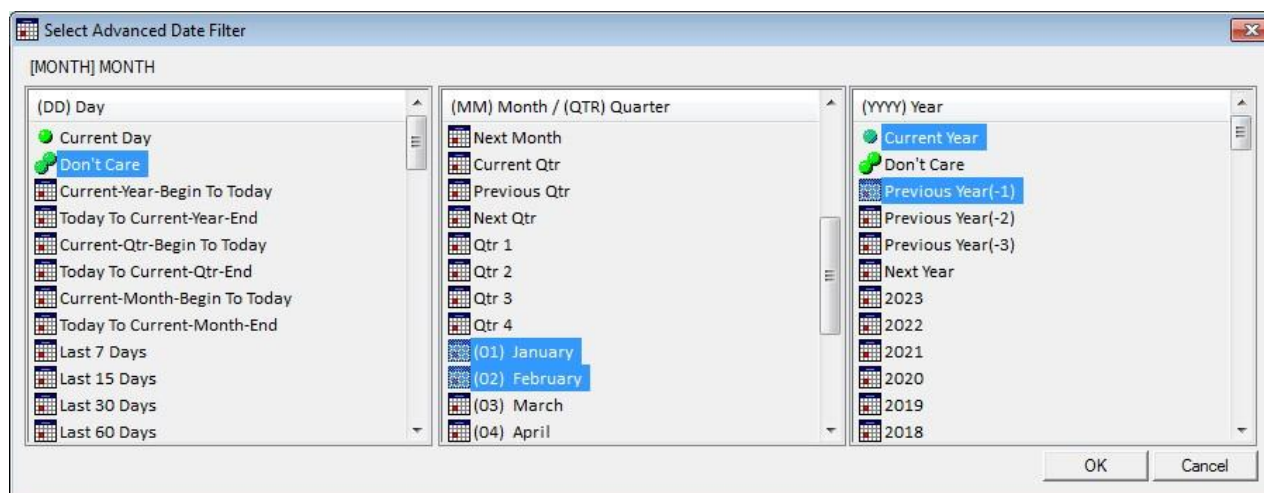
Selecting Advanced Date Filter

The "Advanced Date Filter" is a very sophisticated utility to select complex dates conditions in a very intuitive interface. The date value is divided into three different sections: Day, Month and Year. Each section can have a set of selected options implied on. Every section creates a "OR" logical operator between the selected rows and all three sections are connected via a "AND" logical operator.



The "Select Advanced Date Filter" dialog box allows for complex date filtering across three categories: Day, Month, and Year. Each category has a list of options with checkboxes. In the "Day" section, "Don't Care" is selected. In the "Month" section, "Current Month" and "Previous Month(-1)" are selected. In the "Year" section, "Previous Year(-1)" is selected. The dialog also includes "OK" and "Cancel" buttons.

You must select from all three sections at least one row. For example, the following figure selects months "January" or "February" from the current year or from the previous year no matter which days.



The "Select Advanced Date Filter" dialog box contains three columns of date filter options:

- [MONTH] MONTH**
 - (DD) Day
 - Current Day
 - Don't Care
 - Current-Year-Begin To Today
 - Today To Current-Year-End
 - Current-Qtr-Begin To Today
 - Today To Current-Qtr-End
 - Current-Month-Begin To Today
 - Today To Current-Month-End
 - Last 7 Days
 - Last 15 Days
 - Last 30 Days
 - Last 60 Days
- (MM) Month / (QTR) Quarter**
 - Next Month
 - Current Qtr
 - Previous Qtr
 - Next Qtr
 - Qtr 1
 - Qtr 2
 - Qtr 3
 - Qtr 4
 - (01) January
 - (02) February
 - (03) March
 - (04) April
- (YYYY) Year**
 - Current Year
 - Don't Care
 - Previous Year(-1)
 - Previous Year(-2)
 - Previous Year(-3)
 - Next Year
 - 2023
 - 2022
 - 2021
 - 2020
 - 2019
 - 2018

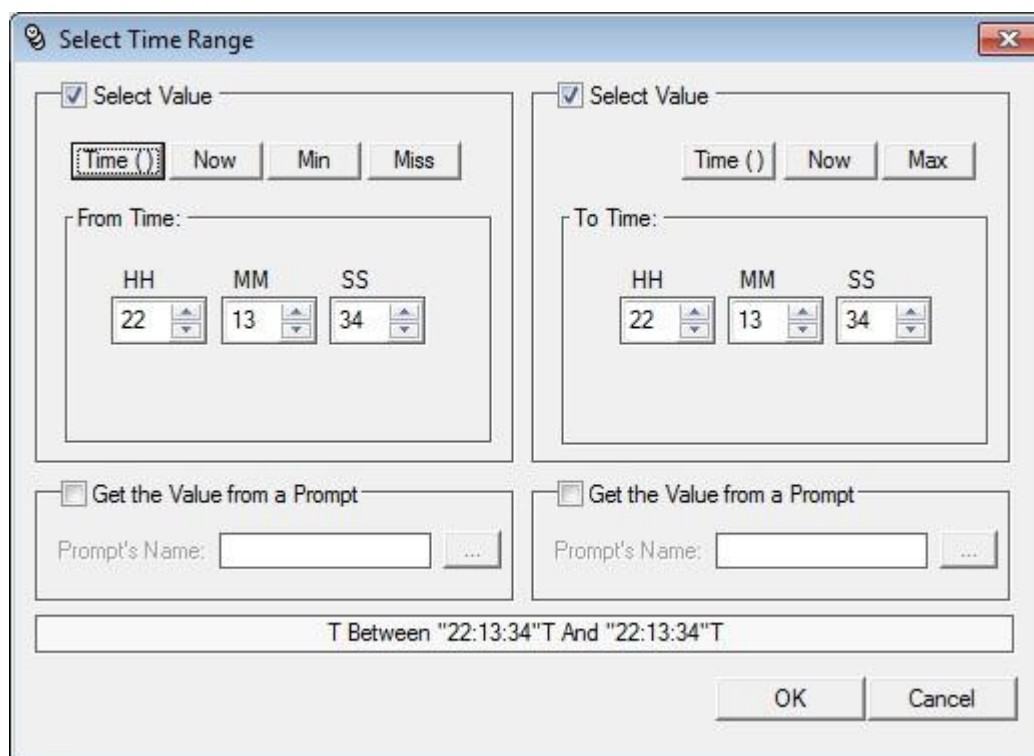
Buttons: OK, Cancel

Warning: Some selection combination might result into a "No Meaning" date clause. For example, if you select from the "Day" column the value "Yesterday" then you must select "Don't Care" from the "Month" and "Year" columns otherwise there is no meaning to the term "Yesterday". For many of these meaningless cases %Visual will alert you.

Time Variable

A time variable is a numeric variable with a SAS time format associated with it. Time values are the number of seconds since midnight of the current date.

Selecting Time Range



The "Select Time Range" dialog box is divided into two main sections for "From Time" and "To Time".

From Time:

- ☒ Select Value
 - Time ()
 - Now
 - Min
 - Miss
- From Time:
 - HH: 22
 - MM: 13
 - SS: 34
- ☐ Get the Value from a Prompt
 - Prompt's Name:

To Time:

- ☒ Select Value
 - Time ()
 - Now
 - Max
- To Time:
 - HH: 22
 - MM: 13
 - SS: 34
- ☐ Get the Value from a Prompt
 - Prompt's Name:

Summary: T Between "22:13:34"T And "22:13:34"T

Buttons: OK, Cancel

Datetime Variable

A datetime variable is a numeric variable with a SAS datetime format associated with it. Datetime values are the number of seconds since midnight of 01Jan1960.

Selecting Datetime Range

Select DateTime Range

☒ Select Value

DateTime() Now Min Miss

From DateTime:

Jan 2013

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

January, 2013

HH MM SS
22 14 4

☐ Get the Value from a Prompt

Prompt's Name:

To DateTime:

Apr 2013

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

April, 2013

HH MM SS
22 14 4

☐ Get the Value from a Prompt

Prompt's Name:

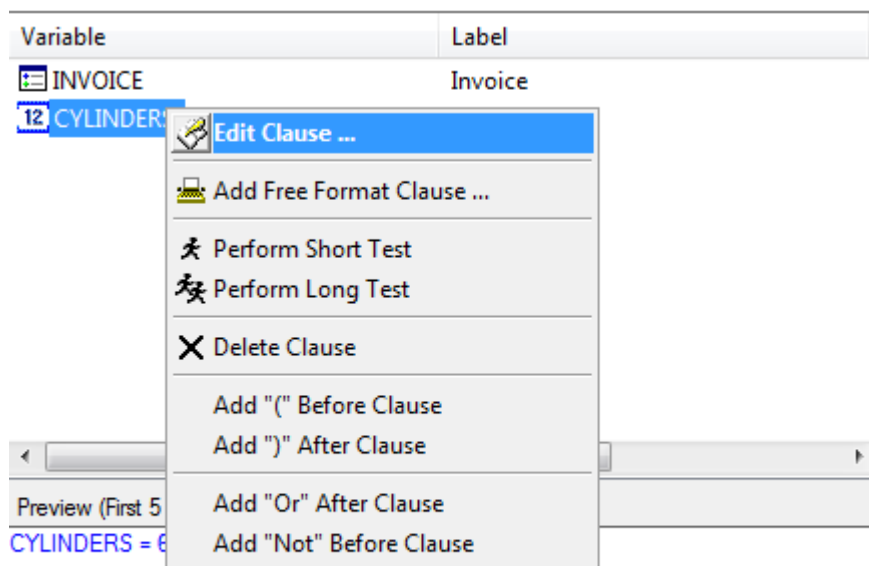
X Between "06JAN2013:22:14:04"DT And "06APR2013:22:14:04"DT

Attributes... OK Cancel

Additional Topics

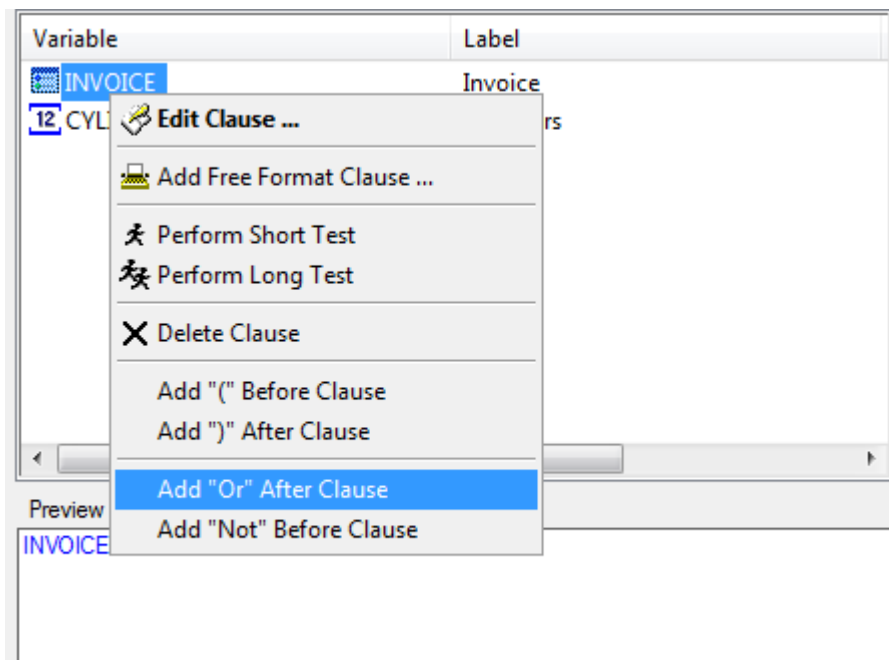
Editing a Clause

After a clause has been set, you can always change its values by selecting the "Edit Clause..." option. You will be presented with the same wizard that was used to build the clause with the previously selected values displayed inside. Change your selection and save the wizard again.



Building More Complex Filters with Logical Operators

By default, all clauses selected in the filter are combined using the "AND" logical operator. This default operator is not shown. If you want a different logical combination of clauses then select the appropriate options from the pop menu as displayed in the following figure:



In the following example, the "OR" logical operator was inserted between the two selected clauses thus overriding the default "AND" operator. If you delete the "OR" line then the default "And" connection will take effect again.

Variable	Label
 INVOICE	Invoice
 Or	[Or]
 12 CYLINDERS	Cylinders

Note: If you combine "AND" and "OR" logical operators in the same filter then you should also take care of the order of precedence of evaluating the filter and use parenthesis for clarity and control. If no parenthesis are present, "AND" will always be evaluated first and then the "OR" will be evaluated. This behavior is similar to evaluating mathematical formulas. For example, the value of: $2 + 4 * 5$ is always 22 since by default the multiplication is calculated first and then the addition takes place. If you want to evaluate the mathematical value in other order then you should add parenthesis like in the following term: $(2 + 4) * 5$ which result into 30.

The "AND" operator is like the mathematical Multiplication and the "OR" operator is like the mathematical Addition. Thus the meaning of $x=3$ OR $y=8$ AND $z=4$ is different from $(x=3$ OR $y=8)$ AND $z=4$. Use %Visual pop menu options 'Add "(" Before Clause' or 'Add ")" After Clause' to insert parenthesis in your filter code.

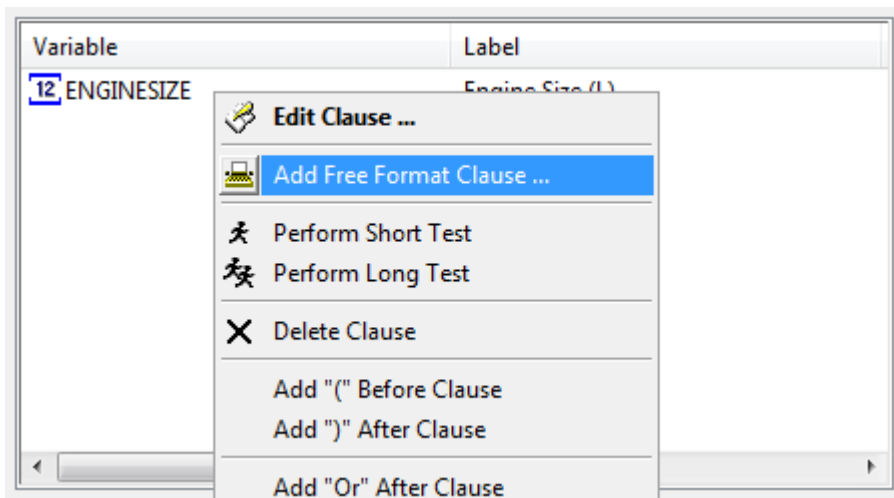
The Example below shows the Where clause:

`(INVOICE > 40000 OR ORIGIN='USA' ) AND ENGINESIZE > 3.5` (Note: The "AND" operator is hidden)

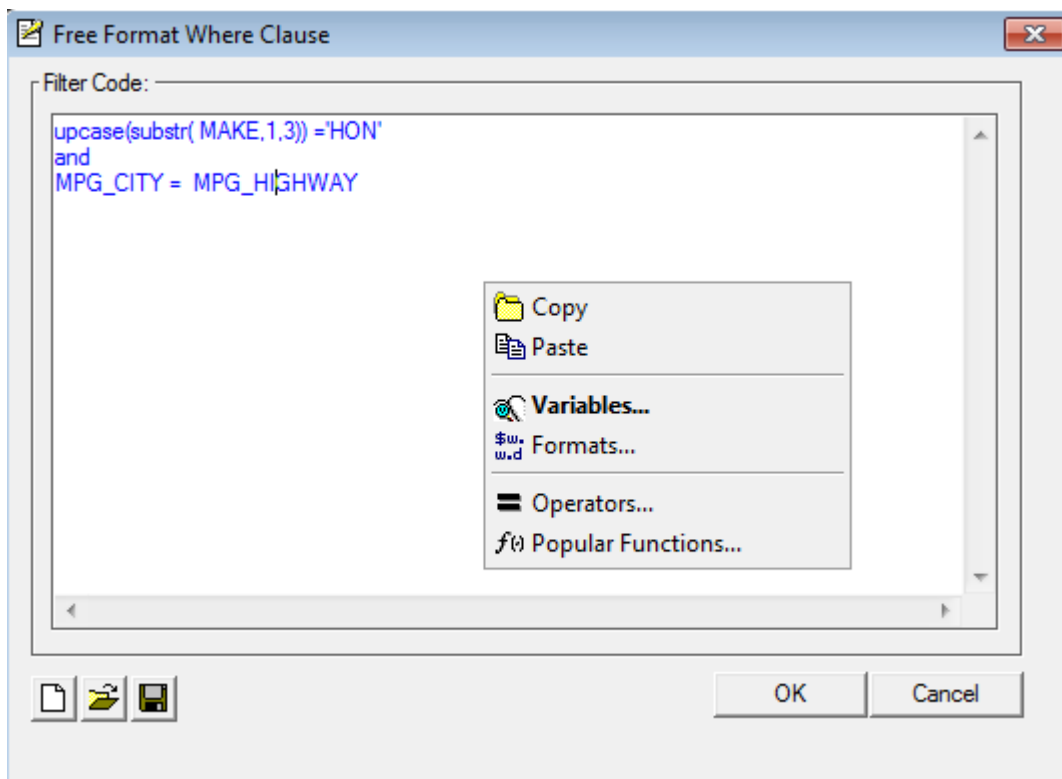
Variable	Label
 (	[Left Parenthesis]
 INVOICE	Invoice
 Or	[Or]
 ab ORIGIN	Origin
)	[Right Parenthesis]
 12 ENGINESIZE	Engine Size (L)

Adding Free Format Clause

In some complex cases, you may need to code the filter manually. For example, a filter like "Actual > 0.95 * Predict" can only be hard-coded manually since there is no predefined wizard in %Visual suitable for this type of clause. To add a "Free Format Where Clause" select this options from the pop menu:



This type of clause can be added anywhere and many times in the list of clauses. The "Free Format Where Clause" window is displayed in the following figure:



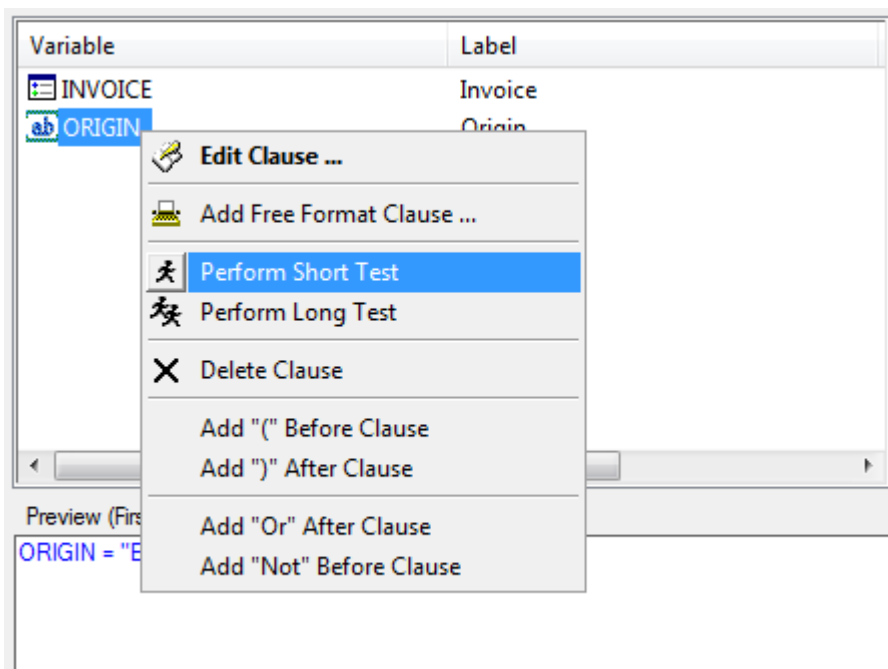
While coding the where clause, you can get assistance from several pop menu options displayed above. For example, if you don't remember variables names, you can open a Variable Window and select the variable. The variable name will be automatically pasted into the editor at the location of the pointer. You can also import or export your code into an external file. %Visual checks the syntax of the manually coded where text on exit, and alerts if any violation exists.

A "Free format where clause" appears as a regular clause along other clauses. The logical connection is always "AND".

Variable	Label
12 ENGINESIZE	Engine Size (L)
Free format clause	With contents
12 CYLINDERS	Cylinders

Checking Your Filter

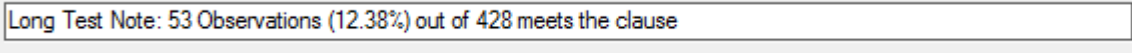
The "Advanced Filter" window checks the validity of the whole "Where" clause and might pop-up some warning windows if a failure occurred in the parsing phase of the clauses. You can also check the clause manually and get some interesting information whether it's valid and how many observations in the data set meets the clause.



Each single clause can be checked (separately from other clauses) by the pop menu options "Perform Short/Long Test..." shown above. The "Short" test searches the data set until an observation is found that meets the clause and then the search process stops. This will quickly ensure that your data set selection is valid and not empty. The message displayed is shown below:

Short Test Note: At least one observation meets the clause

The "Long" search, on the other hand, continues the search until the end of the data set has been reached and reports the number of observation found to meet the clause as shown below:



Long Test Note: 53 Observations (12.38%) out of 428 meets the clause

If no observation meets the clause then a warning message is displayed:



Long Test Error: No observation meets the clause

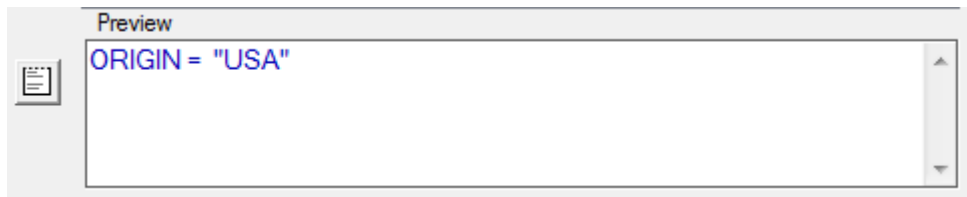
By pressing the "All Clauses - Long test" push-buttons the process runs for all combined clauses.

Note: In some irregular scenarios, the "Short" test may perform as "Long" test. For example, if the only observation that meets the clause is accidentally the last one in the data set, or if no observation meets the clause. In these scenarios, the "Short" test will also run until the end of the data set and there will be no difference in time needed for both tests.

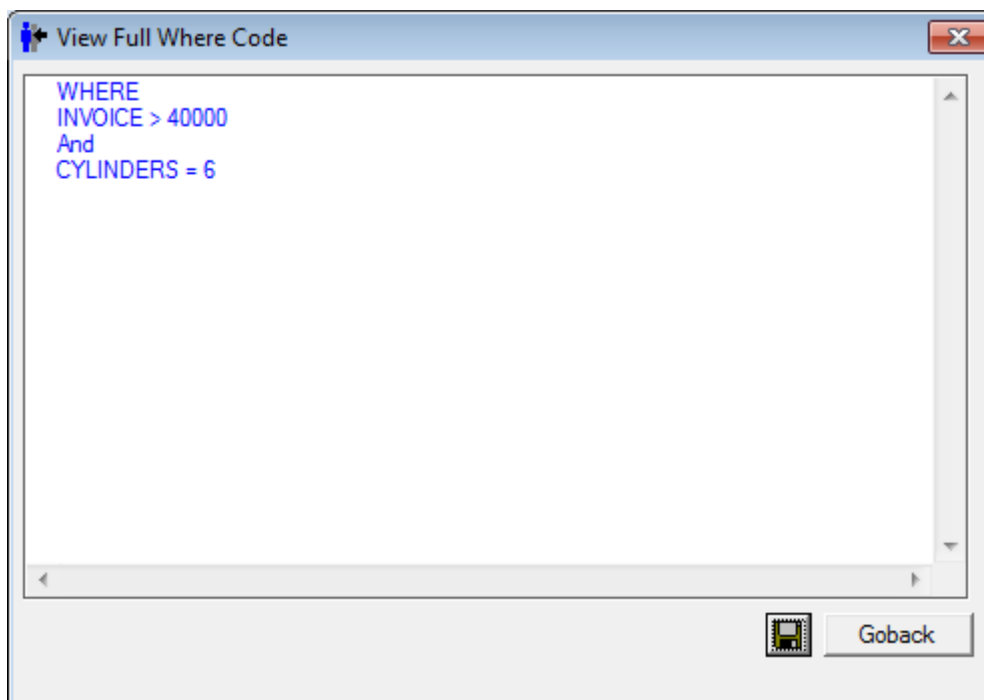
Note: It is mostly recommended to perform those validity tests before closing the "Advanced Filter" window in order to assure the validity of your Where clause.

Viewing full SAS Where Code

Each clause "Behind the scene" code is shown in the "Preview" section of the "Advanced Filter" window when you click on the clause.



You can also view the full SAS "Where" generated code (for all clauses) in a single centralized window accessed by the "View full Code" push-button:



The full where code can be saved to external file or copied and pasted into other SAS programs.

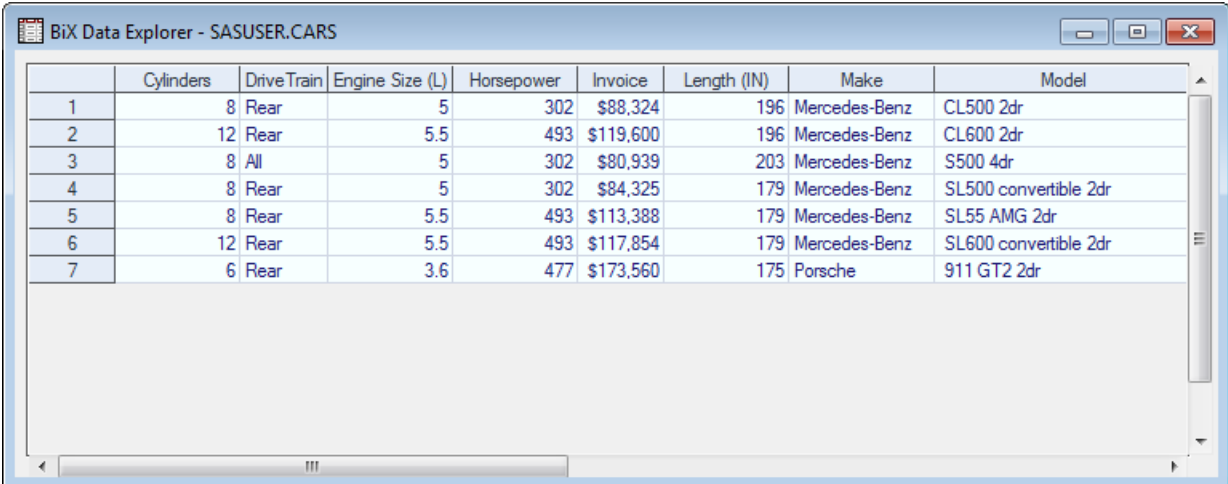
Cycling previously defined clauses

Each advanced filter successfully approved is saved in a temporary %Visual clipboard. This way you can recall the complete filter again and apply it to a different data set. For example, you are working and exploring the "Sales2012" data set with %Visual. A filter formulated while working on this 2012 data set may be also applied to the "Sales2011" data set as well. Open the "Sales2011" data set and select the "Advanced Filter" window. Instead of coding the clauses again, press the "Recycle" push-button (located near the "OK" push-button) and the last saved filter will be loaded into the window. You can click again and the previous-1 will be loaded and so on.

Note: If the clauses that are imported into the window do not match the variables of the data set then an Error message will be displayed.

Viewing and modifying previously defined filter

After completing all definitions in the "Advanced Filter" window, click the "OK" push button and "%Visual Viewer" window will redisplay the data set with the selected filter imposed on it. A filtered data set may have a different color for observations in order to alert the user that the display is currently a filtered one:



	Cylinders	DriveTrain	Engine Size (L)	Horsepower	Invoice	Length (IN)	Make	Model
1	8	Rear	5	302	\$88,324	196	Mercedes-Benz	CL500 2dr
2	12	Rear	5.5	493	\$119,600	196	Mercedes-Benz	CL600 2dr
3	8	All	5	302	\$80,939	203	Mercedes-Benz	S500 4dr
4	8	Rear	5	302	\$84,325	179	Mercedes-Benz	SL500 convertible 2dr
5	8	Rear	5.5	493	\$113,388	179	Mercedes-Benz	SL55 AMG 2dr
6	12	Rear	5.5	493	\$117,854	179	Mercedes-Benz	SL600 convertible 2dr
7	6	Rear	3.6	477	\$173,560	175	Porsche	911 GT2 2dr

Note: You can select the color of filtered data from the "Viewer Attributes..." window.

If you want to View/Change the filter, Simply select this option from the pop menu, and the "Advanced Filter" window will redisplay the previously selected clauses. Make the desired changes and quit the window by pressing the "OK" push button. The "%Visual Viewer" window will be automatically refreshed with the new filter definition.

Combining Advanced filter with other filtering methods

The final effect of a Where clause on a data set is combined from three sources:

- Simple Filters imposed on data set column(s).
- Drill-Down selections.
- Advanced Filter.

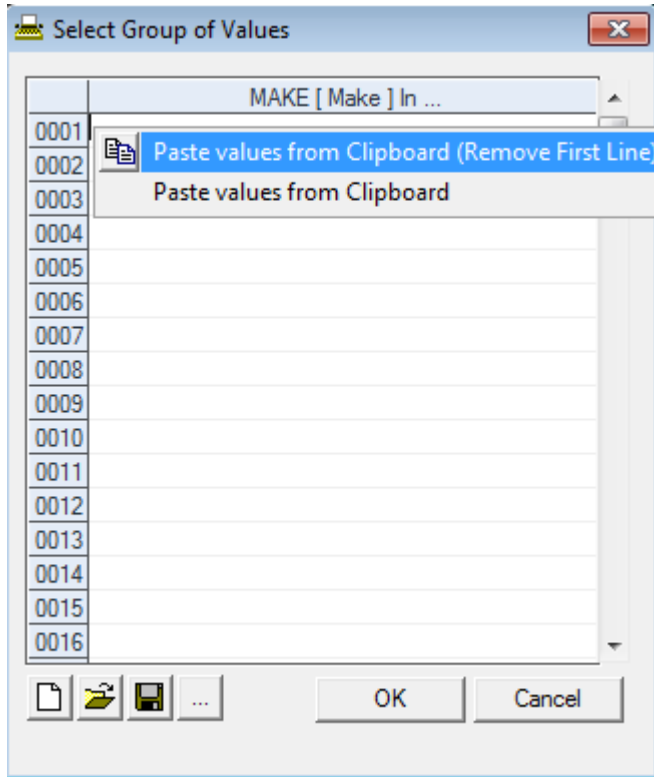
In order to view all three sources in one centralized location use the Decomposition Tree window.

Using Cut and Paste methods for inserting values

You can cut value(s) from a %Visual Viewer window or from other sources (like Excel spreadsheet) and paste them as a value(s) selection for your current filter. This technique can be either used within the "Single Selection" window where the first value from your Cut & Paste buffer will be inserted into the text line, or in "Group of

Values" window where a list of values will be inserted. If your list contains multiple occurrences of the same value, then %Visual sorts this list with "Nodupkey" attribute.

Note: Cutting values from "%Visual Viewer" window always return the variable name as the first line. Thus, you can select whether to remove the first line when pasting it into the "Single" or "Group" windows as shown in the following figure:

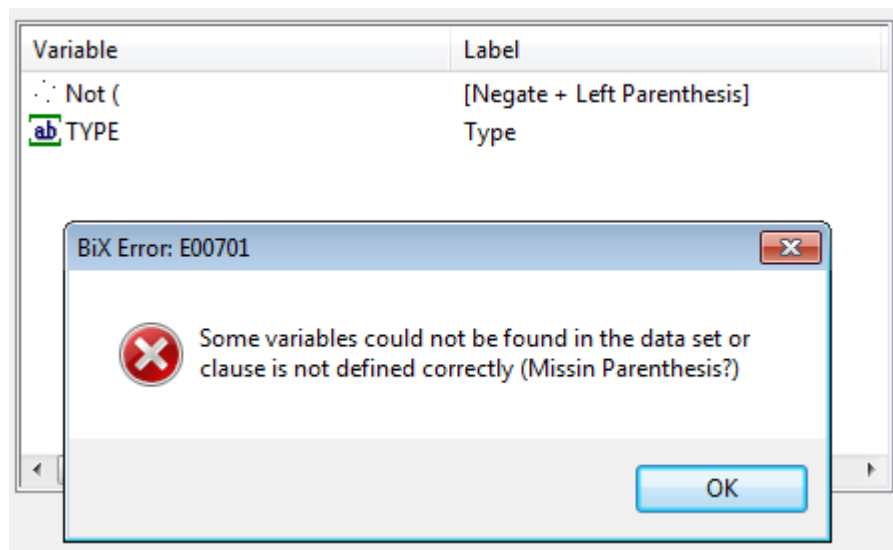


Tip: In simple cases you can use the above technique to merge two data sets. Select the first data set, open it with %Visual Viewer window, then set a filter clause to meet your needs. Cut the values and paste them into the filter clause of the second data set. For example, you want to select all bills of customers of age > 35. The customer age variable is stored in "Customers" data set while bills are stored in "Outgoing Bills" data set. Open the "Customers" data set, set a filter on the variable "Age" and then cut all customer's ID numbers (limited to 9999 values). Open the "Outgoing Bills" data set and set a "Group Values" clause on the "ID" variable. Paste previously selected values from the Paste buffer into the window.

Possible error messages

Using the pop menu options and %Visual wizards to construct the Where clause minimizes the possibility of syntax errors. However certain conditions might cause the error message window to pop:

1. Unequal number of parenthesis:

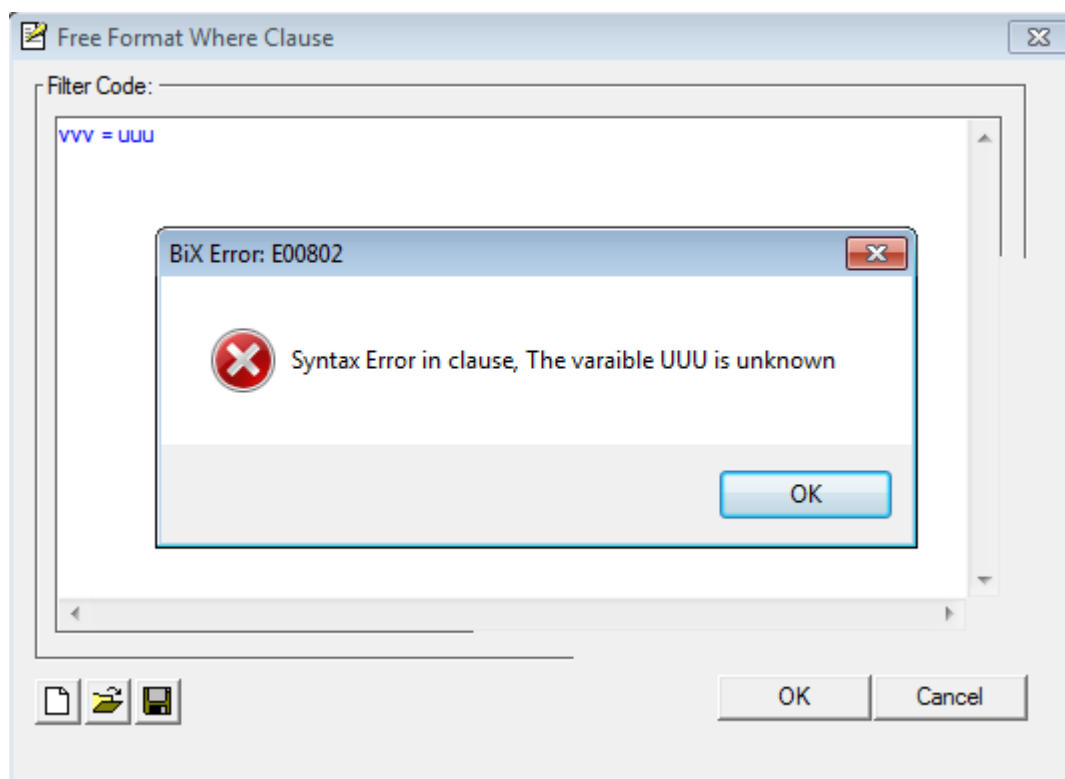


In the example above, the "NOT" operator starts automatically with an opening left parenthesis, but you must assign the right parenthesis manually since %Visual doesn't know where to close the NOT operation.

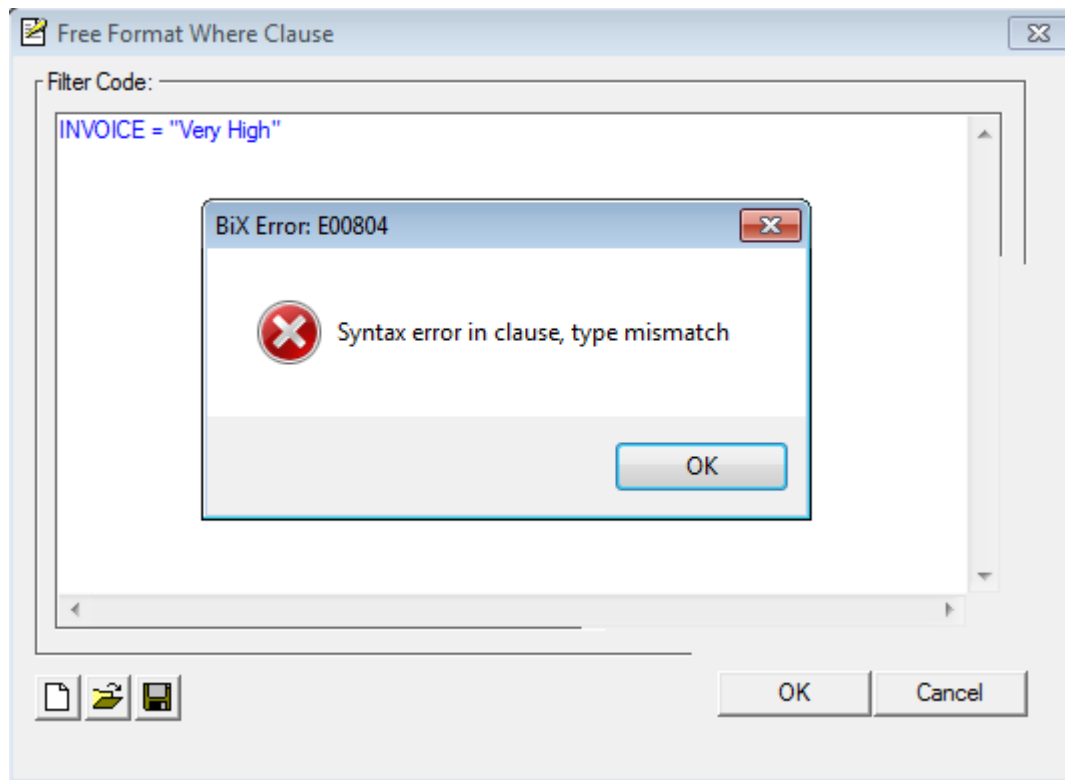
This error message might appear also if you try to use the cycling method of clauses and bring in a clause which does not match the data set.

2. Errors found in the Free format Where clause window

Since this is a free format editor, syntax checks detects some other errors like the one that is displayed in the following figure:



Or an error like the following one:



Selecting Variables

Overview

Selecting Variables

Viewing Variable's Meta-Data

Manipulating The Variable List

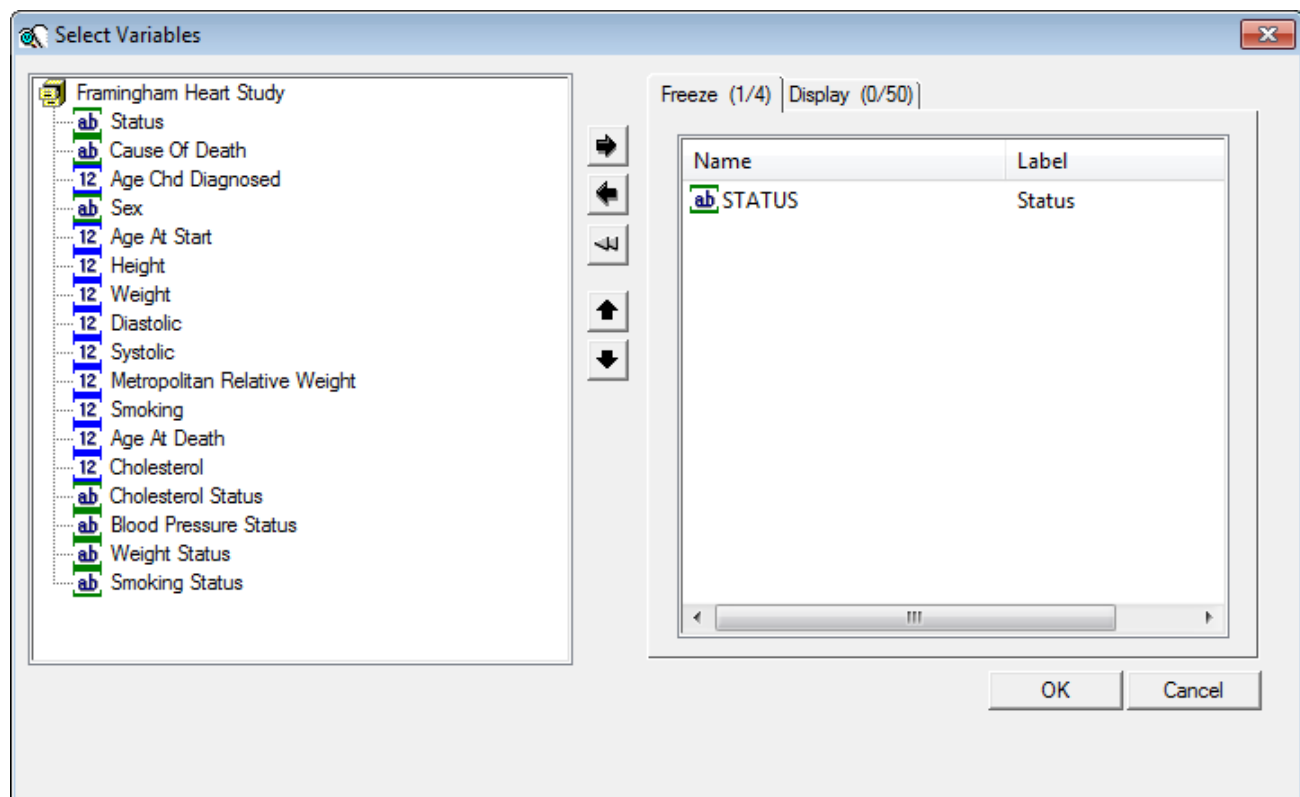
Modifying Default Settings

Overview

If your data set includes many variables, you can use the "Select Variables" window to select only those variables needed by you and arrange them in an order best suited for you. Selecting Variables does not change the data set itself, only the presentation layer is modified.

Selecting Variables

You can select for your specific need up to 54 variables: 4 of them can be used as "Freeze" variables which means that they will be displayed as the 4 left most column. scrolling the table horizontally (left and right) will keep these variables in their positions and only other "Display" variables will scroll. This is very helpful especially when you have many variables and you want some variables (eg. name and id number) to be frozen on the left side). You can use the "Up" or "Dn" push buttons to further arrange variables in each specific tab (Freeze or Display). Removing all variables from the selected lists returns all variables again to be shown in %Visual Viewer window.



The list of variables shown on the left side of the window has a set of icons associated with each type of variable:

Icon	Variable Type
	Character Variable (string)
	Numeric Variable
	Analysis Numeric Variable
	User-defined formatted variable (Numeric or Character format)
	Date Variable
	Time Variable
	DateTime Variable

The icon type is based upon the SAS format associated with the variable. The table below lists all SAS formats known to %Visual and their icon type associations. If there is no associated format, then the icon type is either Numeric or Character based upon the variable type.

Icon	Variable Type
Character	\$ASCII. \$BINARY. \$CHAR. \$EBCDIC. \$HEX. \$MSGCASE. \$OCTAL. \$QUOTE. \$REVERJ. \$REVERS. \$BIDI. \$VSLOG. \$UPCASE. \$VARYING. \$.

Numeric	BEST. BESTD. BINARY. D. FLOAT. RACT. HEX. NUMX. OCTAL. ROMAN. SSN. VAXRB. VMSZN. WORD. WORDS. Z. ZD.
Analysis Numeric	COMMA. COMMAX. DOLLAR. DOLLARX. EURO. EUROX. E. IB. IBR. IEEE. NEGPAREN. PD. PERCENT. PERCENTN. PIB. PIBR. PK. PVALUE. RB.
User-Define Formatted	Any non-blank format not found in any of the other categories.

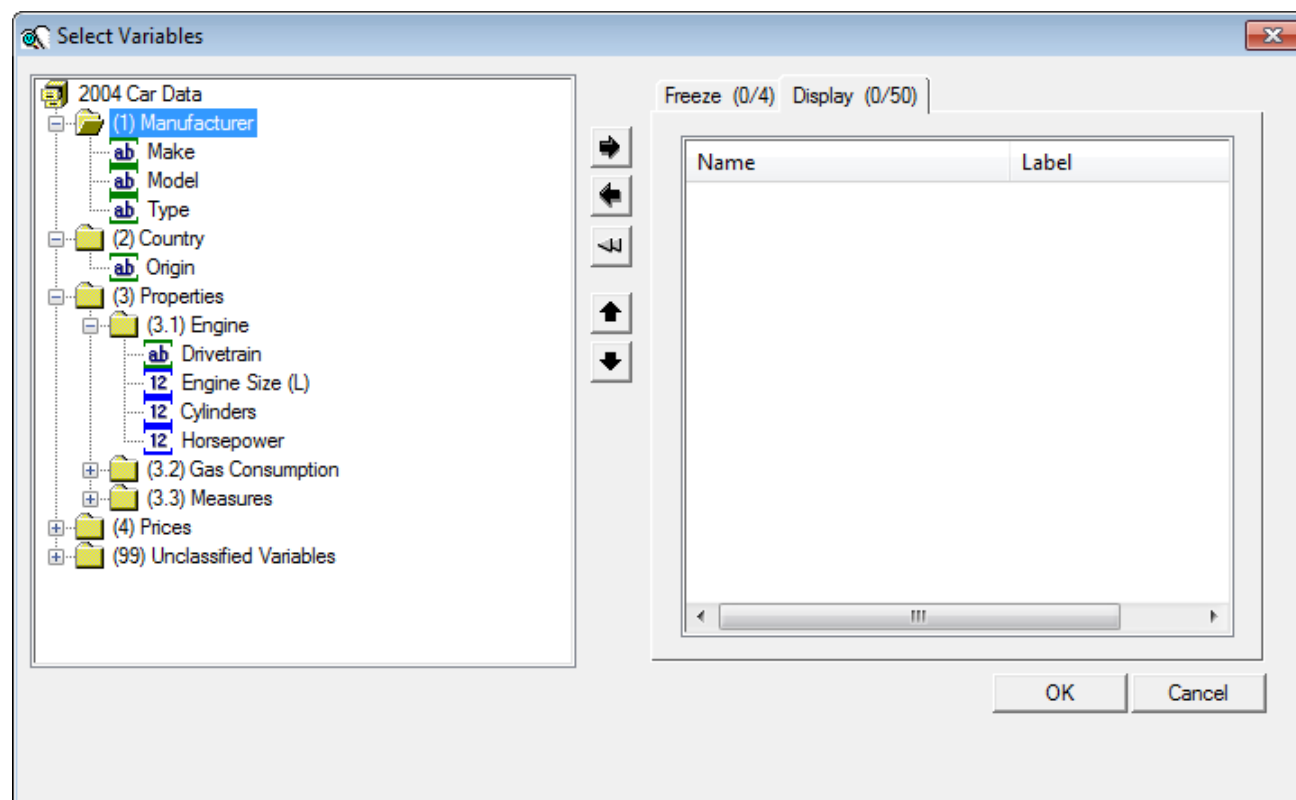
Date	DATE.
	DAY.
	DDMMYY.
	DDMMYYB.
	DDMMYYC.
	DDMMYYD.
	DDMMYYN.
	DDMMYYP.
	DDMMYYs.
	DOWNAME.
	JULDAY.
	JULIAN.
	MMDDYY.
	MMDDYYB.
	MMDDYYC.
	MMDDYYD.
	MMDDYYN.
	MMDDYYP.
	MMDDYYS.
	MMSS.
	MMYY.
	MMYYC.
	MMYYD.
	MMYYN.
	MMYYP.
	MMYYS.
	MONNAME.
	MONTH.
	MONYY.
	PDJULG.
	PDJULI.
	QTR.
	QTRR.
	WEEKDATE.
	WEEKDATX.
	WEEKDAY.
	WEEKU.
	WEEKV.
	WEEKW.
	WORDDATE.
	WORDDATX.
	YEAR.
	YYMM.
	YYMM.
	YYMMC.
	YYMMD.
	YYMMN.
	YYMMP.
	YYMMS.
	YYMMDD.
	YYMMDD.
	YYMMddb.
	YYMMDDC.
	YYMMDDD.
	YYMMDDN.
	YYMMDDP.
	YYMMDDS.
	YYMON.
	YYQ.
	YYQC.
	YYQD.
	YYQN.
	YYQP.
	YYQS.
	YYQR.
	YYQZ.

Time	HHMM. HOUR. TIME. TIMEAMPM.
DateTime	DTDATE. DTMONYY. DTWKDATX. DTYEAR. DTYYQC. TOD. DATEAMPM. DATETIME.

If your organization has a **%Visual Meta-Data Server** license then you can view lists of variables with Meta-Data layer imposed on them (If the %Visual administrator has defined one). Meta-Data layer consist of two possible elements:

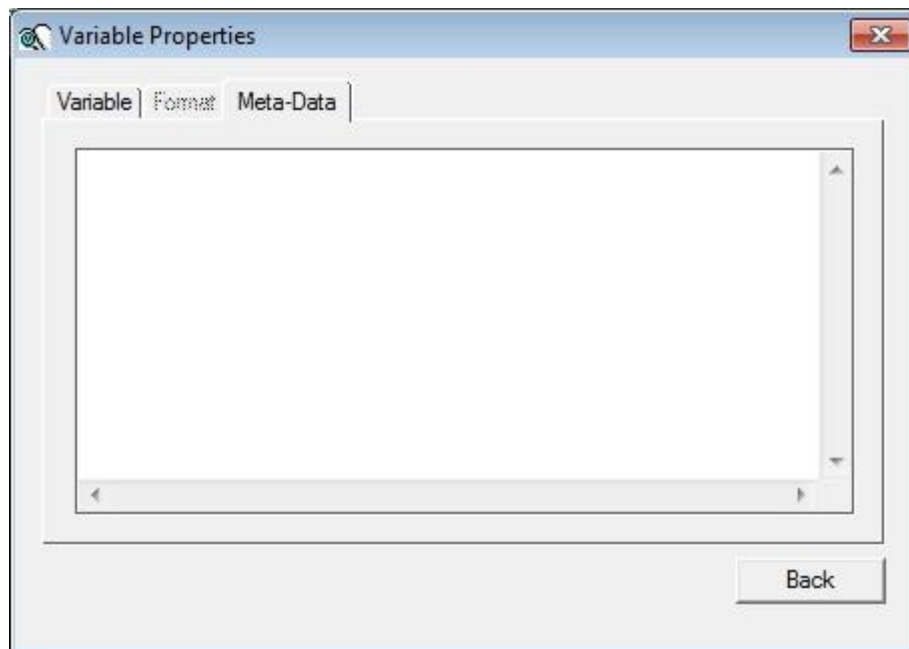
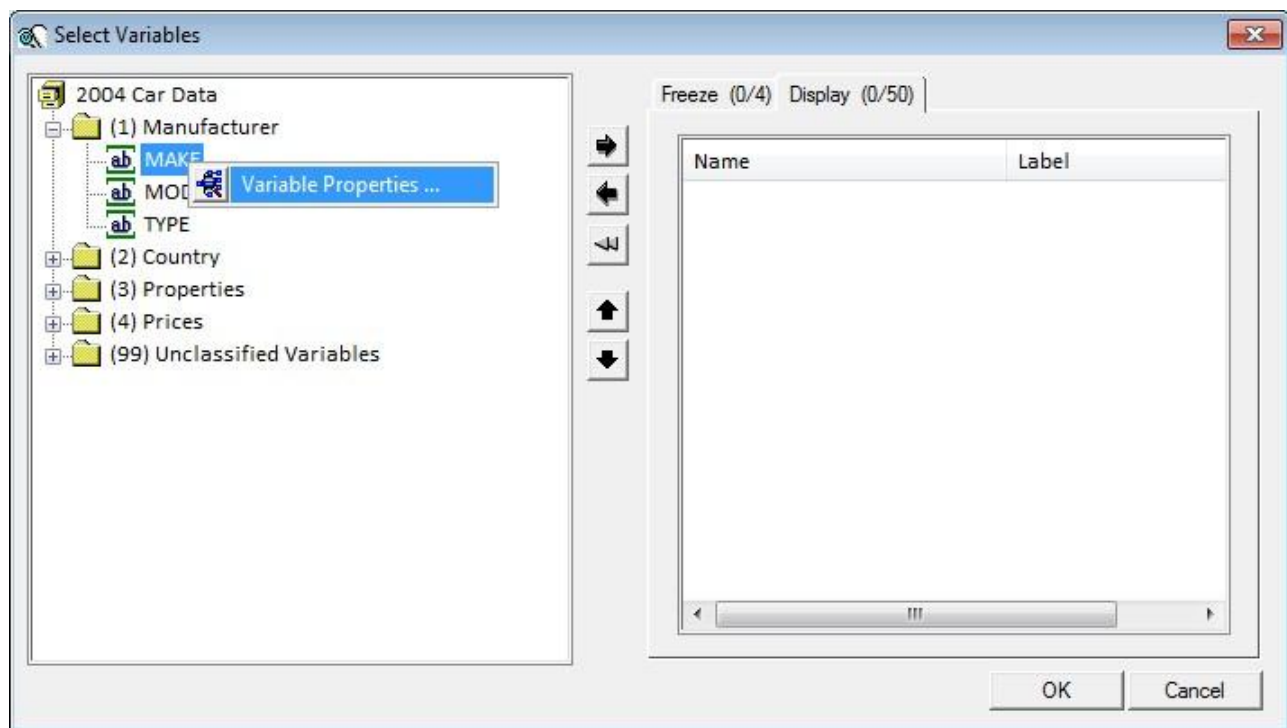
1:) Business Hierarchies which variables are organized into, to show some business logic among variables. For example, "Customer Address" which usually consist a set of : Country, State, City, Street, Street No and Zip code variables can be grouped together into one hierarchy instead of looking for them by the variable name which may need to jump from one position to another.

2:) Explanation to variable's contents which may serve as help for users to understand the meaning of variables in a data set. Meta-Data is defined and maintained by %Visual administrator. The following figure shows the famous "Car" data set form SASHELP libname with Meta-Data imposed on it:



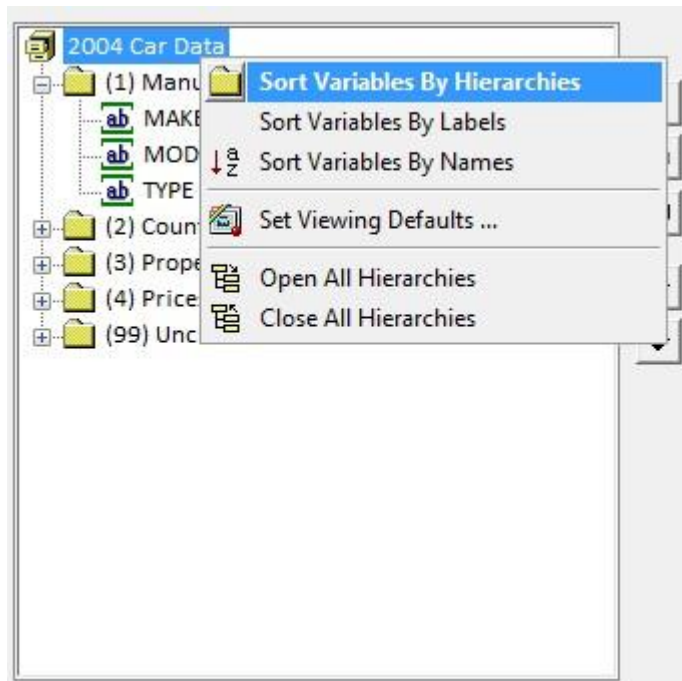
For more information regarding Meta-Data please refer to %Visual Meta-Data Server documentation.

Viewing Variable's Meta-Data



Manipulating The Variable List

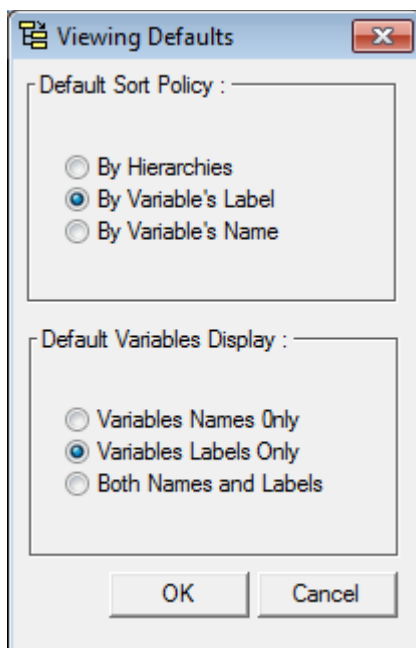
Clicking on the root node (top node) of the variables list displays a pop menu with the following options:



Options regarding hierarchies can only be applied on data sets with meta-data and only if your organization has a **%Visual Meta-Data Server** license.

Modifying Default Settings

Variable lists have a set of default settings controlling its default presentation. Changing defaults will take effect from the next time you open a window with a variable list.



Conditional Formatting

Overview

Ranges Tab

Percentiles Tab

Mean and Standard Deviation Tab

Viewing Conditional Formatting inside %Visual

Viewing Conditional Formatting inside Excel2010

Multiple Conditions

Overview

Conditional formatting is being used to highlight numeric values with different colors according to some rule. For example, sales below certain value or blood pressure above the mean value and so on. Many businesses use this technique to present managers with reports that highlights KPI (Key Performance Indicators) for various fields of interest.

%Visual uses three methods for conditional formatting:

1. **Ranges Method** - Allow up to 3 ranges with fixed values. different coloring systems and symbols can be used to highlight ranges.
2. **Percentiles Method** - A dynamic method which calculates the percentiles on the fly and allow various colors to be assigned to these percentiles.
3. **Mean and Standard Deviation Method** - A dynamic method which calculates statistical measures on the fly and allow various colors to be assigned to these measures.

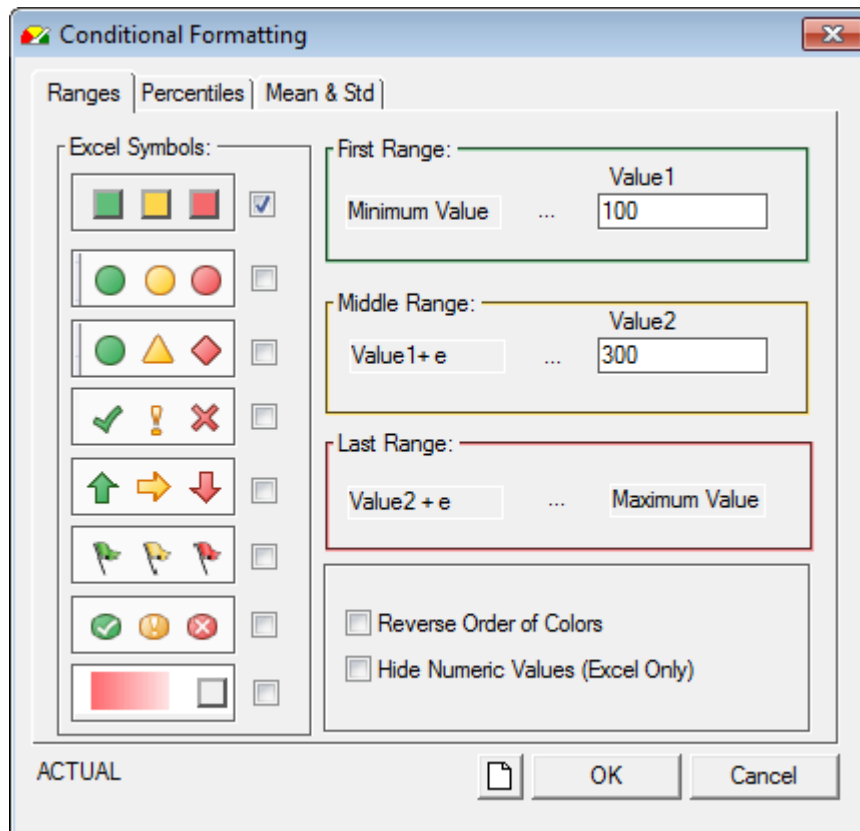
Conditional formatting can be applied to many variables in the Viewer Window. In order to assign a conditional formatting rule to a variable you must first select the variable by highlighting its column and then from the pop menu select "*Conditional Formatting...*"

Drilling or filtering data will keep the rules and will display conditional formatting colors also in the drilled or filtered view. Using one of the dynamic methods will calculate statistical measures "on the fly" and will use colors according to those calculated values on each view of detailed data.

Detailed description of each method follows.

Ranges Tab

The range of values of the selected variable is divided into three sub-ranges. You must select the boundaries of these ranges and type your selected values into the "Value1" and "Value2" fields. You can split the range into only 2 sub-ranges by typing in the same value for both fields.

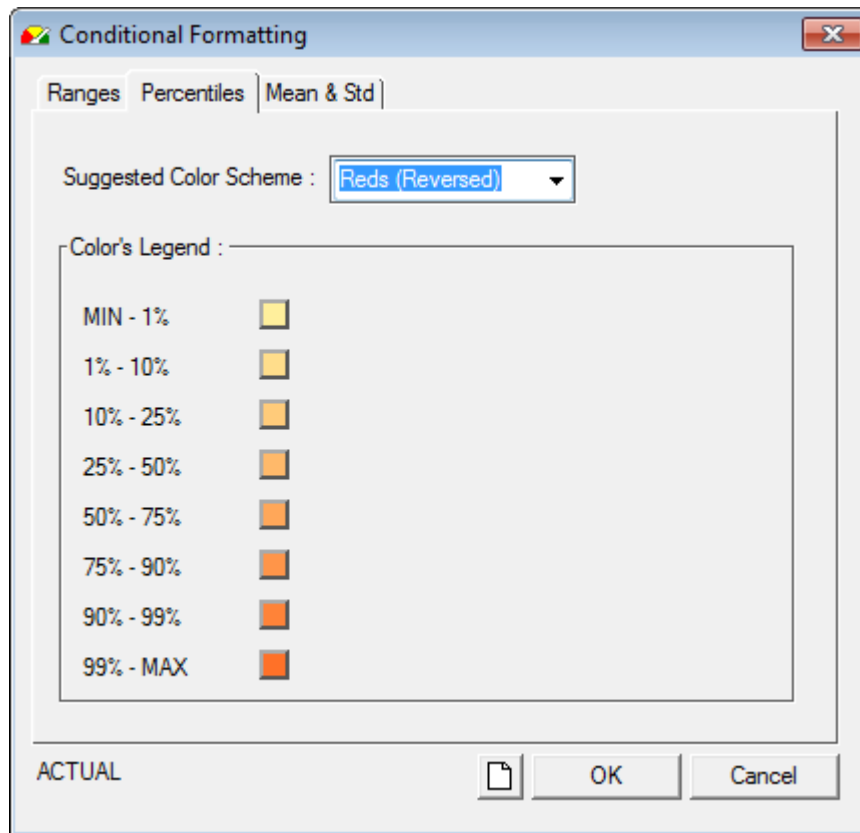


You can select from a variety of colors and symbols for your ranges. %Visual window will only display colors but when %Visual reporting will be applied to the selected section and output will be sent to Excel2010, %Visual will use the Excel2010 set of symbols to display the conditional formatting colors and symbols.

In the first coloring options, you can select your own set of three colors. In the next 6 options %Visual will use predefined colors (Red Yellow and Green) while the last option will use a gradient color from the selected color down to the white color with eight levels of colors each representing a range of $(\text{HighestValue} - \text{LowestValue}) / 8$.

Percentiles Tab

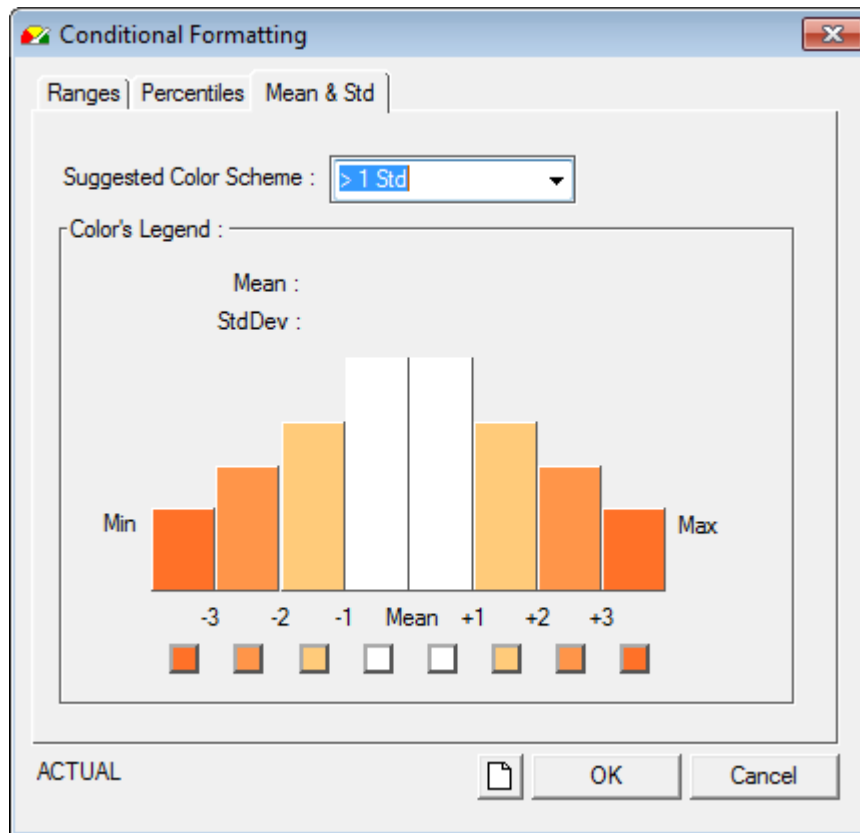
The percentile method is a dynamic one which means that colors are assigned to values according to statistical calculation done "on the fly".



You can select a color scheme from a predefined set or change each percentile color specifically. When you'll edit again the rule, %Visual will display the calculated values along the colors.

Mean and Standard Deviation Tab

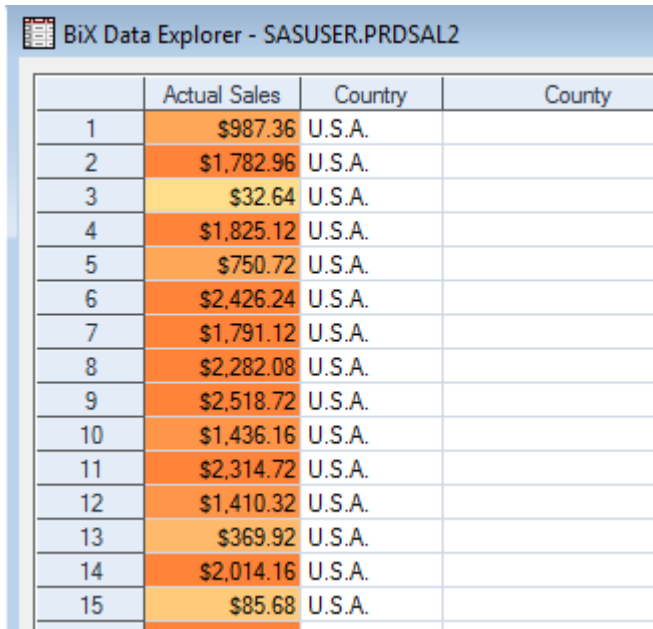
The mean and Std method is a dynamic method. values of mean and standard deviations are being calculated "on the fly".



A simple thematic bar diagram is being used to clarify the colors and values. You can select a predefined scheme or change the colors to your own need. When you'll edit again the rule, %Visual will display the calculated values along the colors and bars.

Viewing Conditional Formatting inside %Visual

After selecting the desired method for the conditional formatting, %Visual Viewer window displays the colors as in the following figure:



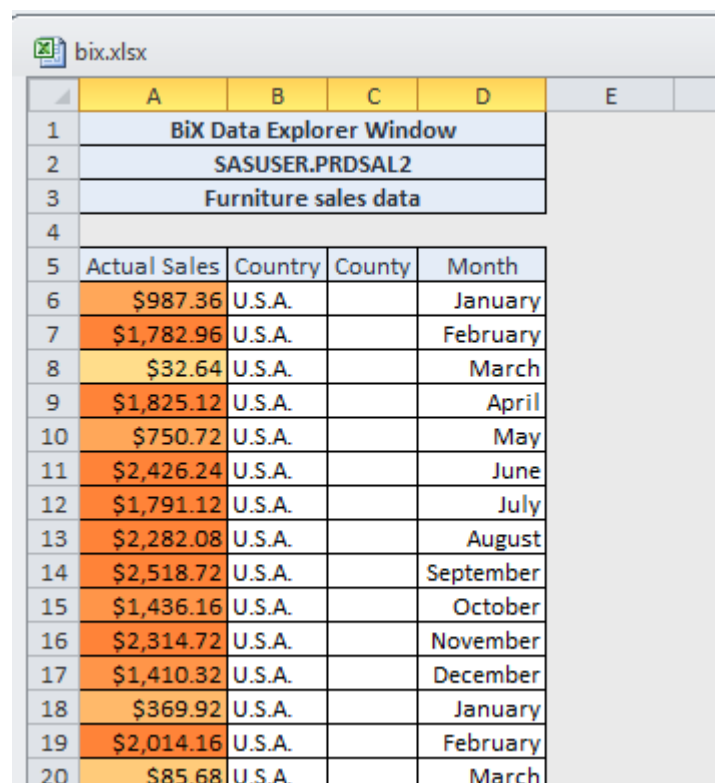
BiX Data Explorer - SASUSER.PRDSAL2

	Actual Sales	Country	County
1	\$987.36	U.S.A.	
2	\$1,782.96	U.S.A.	
3	\$32.64	U.S.A.	
4	\$1,825.12	U.S.A.	
5	\$750.72	U.S.A.	
6	\$2,426.24	U.S.A.	
7	\$1,791.12	U.S.A.	
8	\$2,282.08	U.S.A.	
9	\$2,518.72	U.S.A.	
10	\$1,436.16	U.S.A.	
11	\$2,314.72	U.S.A.	
12	\$1,410.32	U.S.A.	
13	\$369.92	U.S.A.	
14	\$2,014.16	U.S.A.	
15	\$85.68	U.S.A.	

Scrolling down or up observations will continue to display the colored values accordingly. If you wish to view the values which colors are based on, highlight again the variable and select the "Conditional Formatting" option from the pop menu. You can now view or modify your previous selections. Conditional formatting definitions are kept along filtering the data or drilling down using the "Frequency Drill-Down" or "Univariate Drill-Down".

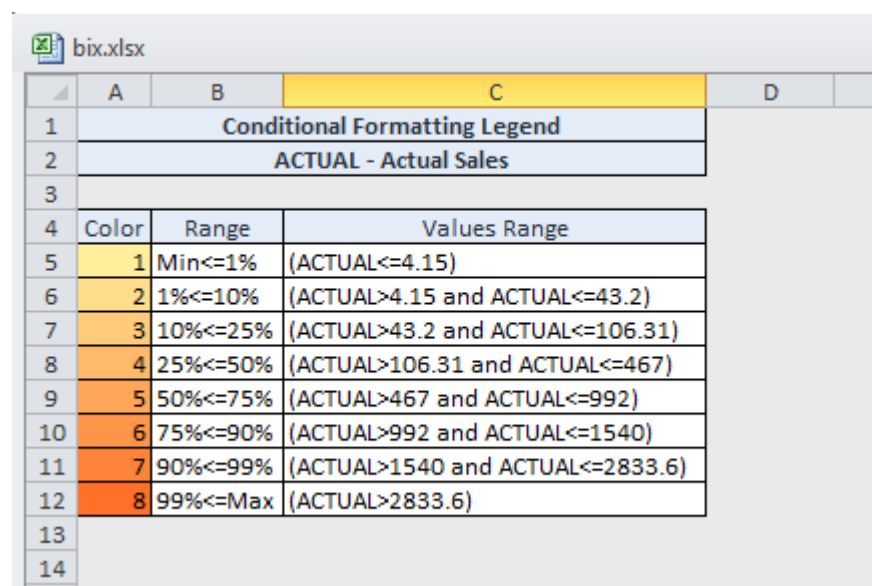
Viewing Conditional Formatting inside Excel2010

Reporting on a section of the table which has a conditional formatting rule on one or more of the variables, will automatically use those colors also in the output documents as displayed in the following example of an Excel2010 spreadsheet:



	A	B	C	D	E
1	BiX Data Explorer Window				
2	SASUSER.PRDSAL2				
3	Furniture sales data				
4					
5	Actual Sales	Country	County	Month	
6	\$987.36	U.S.A.		January	
7	\$1,782.96	U.S.A.		February	
8	\$32.64	U.S.A.		March	
9	\$1,825.12	U.S.A.		April	
10	\$750.72	U.S.A.		May	
11	\$2,426.24	U.S.A.		June	
12	\$1,791.12	U.S.A.		July	
13	\$2,282.08	U.S.A.		August	
14	\$2,518.72	U.S.A.		September	
15	\$1,436.16	U.S.A.		October	
16	\$2,314.72	U.S.A.		November	
17	\$1,410.32	U.S.A.		December	
18	\$369.92	U.S.A.		January	
19	\$2,014.16	U.S.A.		February	
20	\$85.68	U.S.A.		March	

A legend describing the values of each color will be also automatically produced and will be placed in a separate sheet inside the Excel2010 workbook as displayed in the following figure:



	A	B	C	D
1	Conditional Formatting Legend			
2	ACTUAL - Actual Sales			
3				
4	Color	Range	Values Range	
5	1	Min<=1%	(ACTUAL<=4.15)	
6	2	1%<=10%	(ACTUAL>4.15 and ACTUAL<=43.2)	
7	3	10%<=25%	(ACTUAL>43.2 and ACTUAL<=106.31)	
8	4	25%<=50%	(ACTUAL>106.31 and ACTUAL<=467)	
9	5	50%<=75%	(ACTUAL>467 and ACTUAL<=992)	
10	6	75%<=90%	(ACTUAL>992 and ACTUAL<=1540)	
11	7	90%<=99%	(ACTUAL>1540 and ACTUAL<=2833.6)	
12	8	99%<=Max	(ACTUAL>2833.6)	
13				
14				

If one of the Excel2010 coloring options was selected, then the values inside Excel2010 will be displayed using standard Excel2010 colored symbols as displayed in the following figure:

bix.xlsx

	A	B	C	D	E	F
1	BiX Data Explorer Window					
2	SASUSER.PRDSAL2					
3	Furniture sales data					
4						
5	Actual Sales	Country	County	Month	Month/Year	
6	◆ \$40.80	U.S.A.		March	Mar1997	
7	▲ \$2,281.40	U.S.A.		April	Apr1997	
8	◆ \$938.40	U.S.A.		May	May1997	
9	● \$3,032.80	U.S.A.		June	Jun1997	
10	▲ \$2,238.90	U.S.A.		July	Jul1997	
11	▲ \$2,852.60	U.S.A.		August	Aug1997	
12	● \$3,148.40	U.S.A.		September	Sep1997	
13	◆ \$1,795.20	U.S.A.		October	Oct1997	
14	▲ \$2,893.40	U.S.A.		November	Nov1997	
15	◆ \$1,762.90	U.S.A.		December	Dec1997	
16	◆ \$462.40	U.S.A.		January	Jan1997	
17	▲ \$2,517.70	U.S.A.		February	Feb1997	
18	◆ \$107.10	U.S.A.		March	Mar1997	
19	● \$3,367.70	U.S.A.		April	Apr1997	
20	▲ \$2,517.70	U.S.A.		May	May1997	
21						
22	Printed On: 11/01/2008 12:14					
23						

BiX Data Explorer Conditional Formatting Legend

Multiple Conditions

Multiple and different condition can be applied to each of the numeric variables inside %Visual Viewer window as displayed in the following figure. "Actual Sales" was assigned the gradient color option while "Predicted Sales" was assigned the Mean & Std method.

BiX Data Explorer - SASUSER.PRDSAL2

	Actual Sales	Predicted Sales	Country	County	Month
1	\$987.36	\$692.24	U.S.A.		Jan
2	\$1,782.96	\$568.48	U.S.A.		Feb
3	\$32.64	\$16.32	U.S.A.		Mar
4	\$1,825.12	\$756.16	U.S.A.		Apr
5	\$750.72	\$723.52	U.S.A.		May
6	\$2,426.24	\$2,428.96	U.S.A.		Jun
7	\$1,791.12	\$2,250.80	U.S.A.		Jul
8	\$2,282.08	\$350.88	U.S.A.		Aug
9	\$2,518.72	\$1,736.72	U.S.A.		Sep
10	\$1,436.16	\$2,167.84	U.S.A.		Oct
11	\$2,314.72	\$62.56	U.S.A.		Nov
12	\$1,410.32	\$1,670.08	U.S.A.		Dec
13	\$369.92	\$1,365.44	U.S.A.		Jan
14	\$2,014.16	\$2,358.24	U.S.A.		Feb
15	\$85.68	\$2,594.88	U.S.A.		Mar
16	\$2,694.16	\$1,403.52	U.S.A.		Apr
17	\$2,014.16	\$707.20	U.S.A.		May
18	\$1,500.08	\$2,461.60	U.S.A.		Jun
19	\$2,133.84	\$2,486.08	U.S.A.		Jul
20	\$1,834.64	\$2,884.56	U.S.A.		Aug
21	\$2,687.36	\$1,224.00	U.S.A.		Sep

Reporting this example into Excel2010 produces the following result

bix.xlsx

	A	B	C	D	E	F	G	H	I
3	Furniture sales data								
4									
5	Actual Sales	Predicted Sales							
6	\$987.36	\$692.24							
7	\$1,782.96	\$568.48							
8	\$32.64	\$16.32							
9	\$1,825.12	\$756.16							
10	\$750.72	\$723.52							
11	\$2,426.24	\$2,428.96							
12	\$1,791.12	\$2,250.80							
13	\$2,282.08	\$350.88							
14	\$2,518.72	\$1,736.72							
15	\$1,436.16	\$2,167.84							
16	\$2,314.72	\$62.56							
17	\$1,410.32	\$1,670.08							
18	\$369.92	\$1,365.44							
19	\$2,014.16	\$2,358.24							
20	\$85.68	\$2,594.88							
21	\$2,694.16	\$1,403.52							

BiX Data Explorer Conditional Formatting Legend

And a legend page in the second sheet (All legends are grouped into one sheet):

Conditional Formatting Legend			Conditional Formatting Legend		
ACTUAL - Actual Sales			PREDICT - Predicted Sales		
Color	Range	Values Range	Color	Range	Values Range
	range1/8	(ACTUAL<=439.45)	1	< Mean-3Std	(PREDICT<=-1364.19)
	range2/8	(ACTUAL>439.45 and ACTUAL<=878.9)	2	> Mean-3Std <= Mean-2Std	(PREDICT>-1364.19 and PREDICT<=-679.1)
	range3/8	(ACTUAL>878.9 and ACTUAL<=1318.35)	3	> Mean-2Std <= Mean-1Std	(PREDICT>-679.1 and PREDICT<=6)
	range4/8	(ACTUAL>1318.35 and ACTUAL<=1757.8)	4	> Mean-1Std <= Mean	(PREDICT>6 and PREDICT<=691.1)
	range5/8	(ACTUAL>1757.8 and ACTUAL<=2197.25)	5	> Mean <= Mean+1Std	(PREDICT>691.1 and PREDICT<=1376.2)
	range6/8	(ACTUAL>2197.25 and ACTUAL<=2636.7)	6	> Mean+1Std <= Mean+2Std	(PREDICT>1376.2 and PREDICT<=2061.3)
	range7/8	(ACTUAL>2636.7 and ACTUAL<=3076.15)	7	> Mean+2Std <= Mean+3Std	(PREDICT>2061.3 and PREDICT<=2746.39)
	range8/8	(ACTUAL>3076.15)	8	> Mean+3Std	(PREDICT>2746.39)

Sorting Data

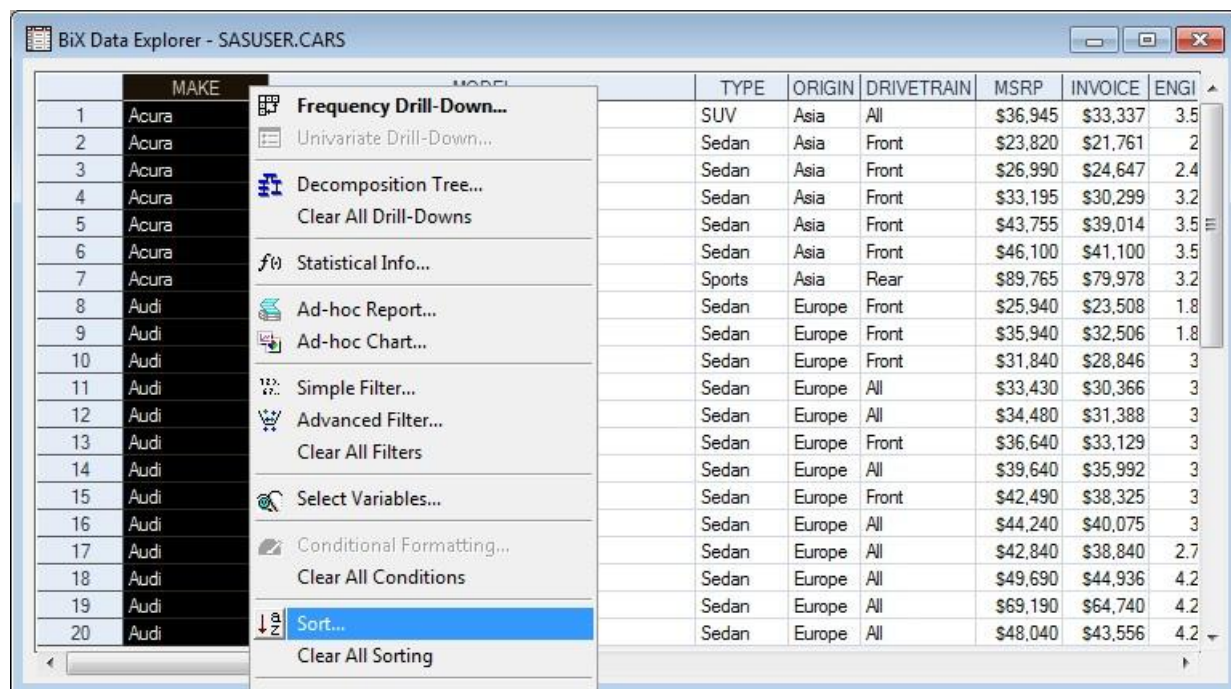
Overview

Sort Options

Clear Sorting

Overview

Data in %Visual Window can be sorted (Without modifications to the original data set). Highlight the variables (one or more) to sort. If the variables are not adjacent, you can first use the "move column" option from the pop menu to move the desired column(s) to a new place in the table. Sorting is usually needed when you would like to view the high (or low) values on the top observations.

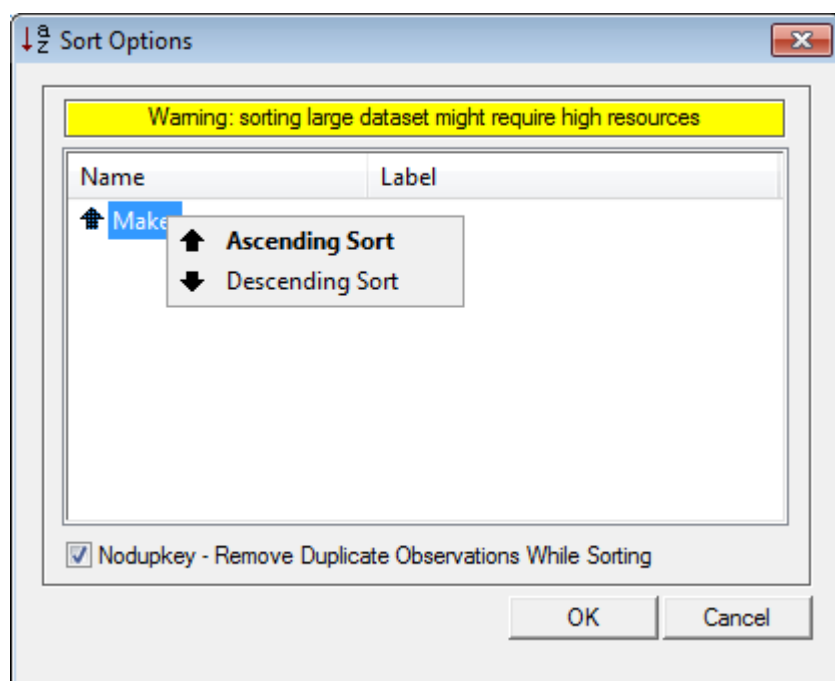


Sorting is done on the entire table starting from the leftmost selected variable. After selecting the "Sort..." option from the pop menu, the "Sort Options" window will be opened.

Sort Options

The "Sort Options" window allow to define the sorting order on each selected variable as displayed in the following figure.

In addition to setting the sorting order you can ask for "Nodupkey" sorting option that eliminates duplicate keys observations to be displayed. If the "Nodupkey" option has been selected, then the background color of the observations is changed to the color of "Filtered Data" color (This color can be set using the "Viewer Attributes..." pop menu option)



Warning: Sorting large data sets might require high computing resources.

Clear Sorting

The "Clear All Sorting" pop menu option from "%Visual Viewer" Window will restore the data set to its original state.

Jumping to Start/End of Data

If the data set is large (Many observations) then a more efficient way to scroll down to the last or first observation is by using the "*Goto*" pop menu options.

At the first time, the operation may take a while but afterwards jumping to the first or last observation will be done very quickly.

Moving Columns

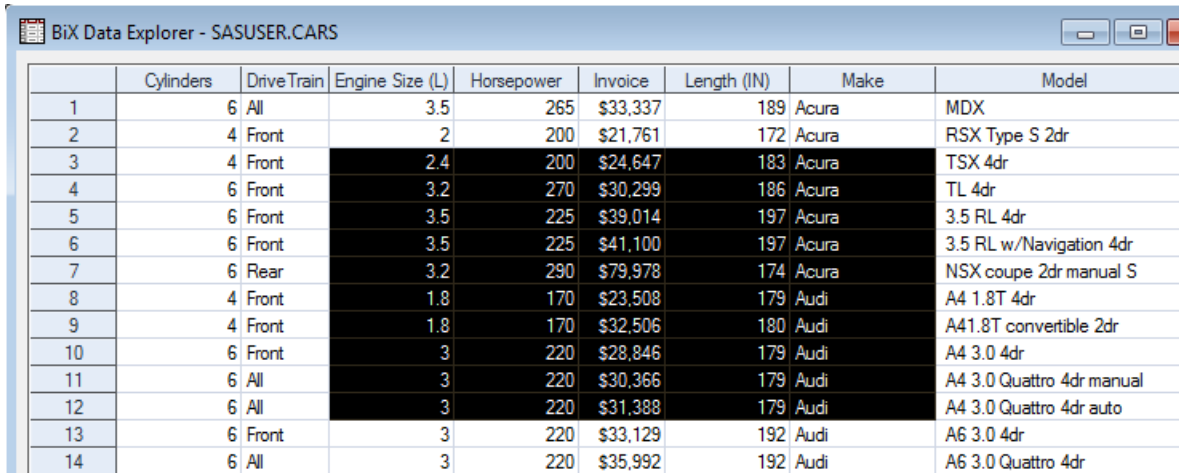
Moving columns is used to organize the columns in your specific order preference. There is an alternative way to organize the variable by using the "Select Variables..." window.

You can move one or more columns simultaneously as described in the following procedure:

First highlight the column(s) to be moved and select the option "*Move Column*" from the pop menu. Then highlight the variable that your moved columns will be inserted after, and select the option "*Move Column After*".

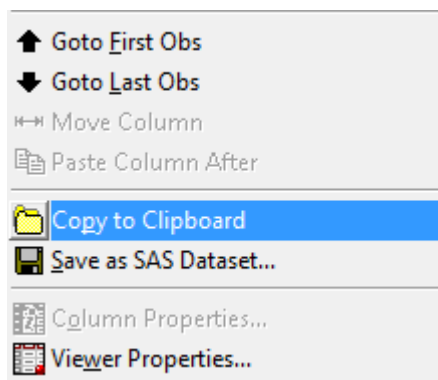
Copy Data to Clipboard

Highlight a section of the window as in the following figure: (Tip: You can also highlight the entire table by selecting the left top cell).

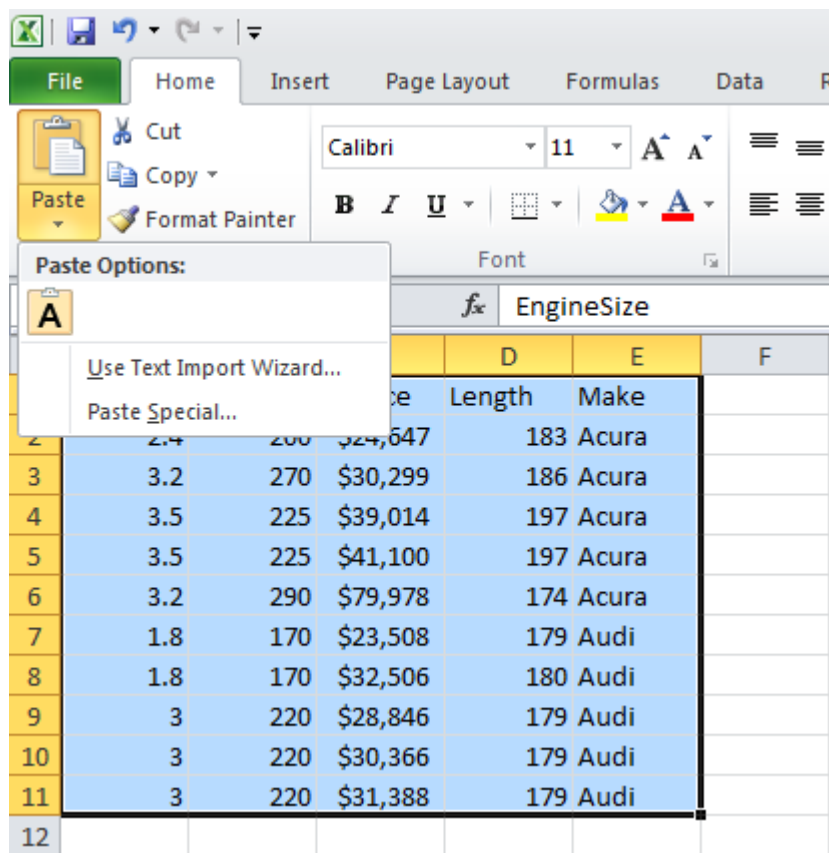


	Cylinders	DriveTrain	Engine Size (L)	Horsepower	Invoice	Length (IN)	Make	Model
1	6	All	3.5	265	\$33,337	189	Acura	MDX
2	4	Front	2	200	\$21,761	172	Acura	RSX Type S 2dr
3	4	Front	2.4	200	\$24,647	183	Acura	TSX 4dr
4	6	Front	3.2	270	\$30,299	186	Acura	TL 4dr
5	6	Front	3.5	225	\$39,014	197	Acura	3.5 RL 4dr
6	6	Front	3.5	225	\$41,100	197	Acura	3.5 RL w/Navigation 4dr
7	6	Rear	3.2	290	\$79,978	174	Acura	NSX coupe 2dr manual S
8	4	Front	1.8	170	\$23,508	179	Audi	A4 1.8T 4dr
9	4	Front	1.8	170	\$32,506	180	Audi	A4 1.8T convertible 2dr
10	6	Front	3	220	\$28,846	179	Audi	A4 3.0 4dr
11	6	All	3	220	\$30,366	179	Audi	A4 3.0 Quattro 4dr manual
12	6	All	3	220	\$31,388	179	Audi	A4 3.0 Quattro 4dr auto
13	6	Front	3	220	\$33,129	192	Audi	A6 3.0 4dr
14	6	All	3	220	\$35,992	192	Audi	A6 3.0 Quattro 4dr

Then by selecting the "Copy To Clipboard" menu option, you can now paste the data into other compliant Windows applications like Excel, Access and many more who can paste a tab delimited data file stored in the Cut & Paste buffer



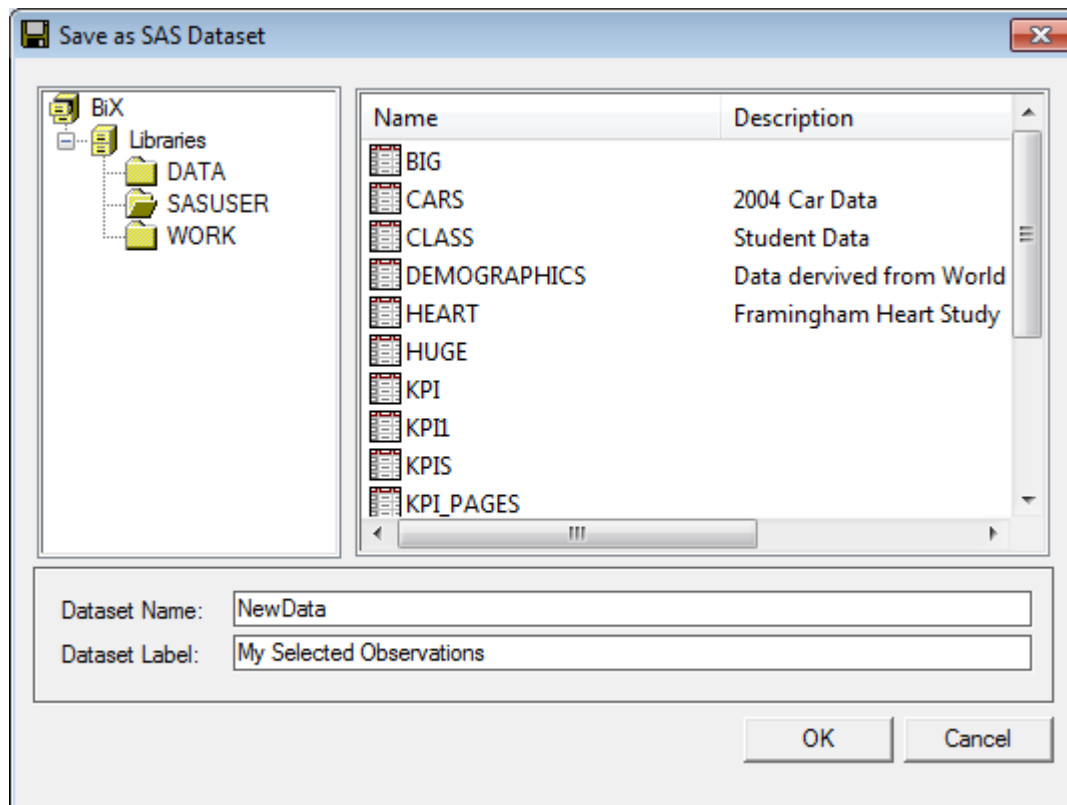
Cutting & Pasting data using this method is a very quick and simple method, yet it does not keep coloring and other attributes of the data.



SAS Variables names are automatically inserted into the first line of the pasted text.

Save as SAS Data set

Highlight a section of the Viewer Window. Then by selecting the "Save as SAS Data set" menu option, you can now save the data into a new SAS Data set.



You can save a new data set only to those libnames that are not have the "read-only" access method namely: the Work, Sasuser and other read/write libnames defined in your SAS session. You must supply a Data set name (A valid SAS name) and optionally, supply a label for the data set.

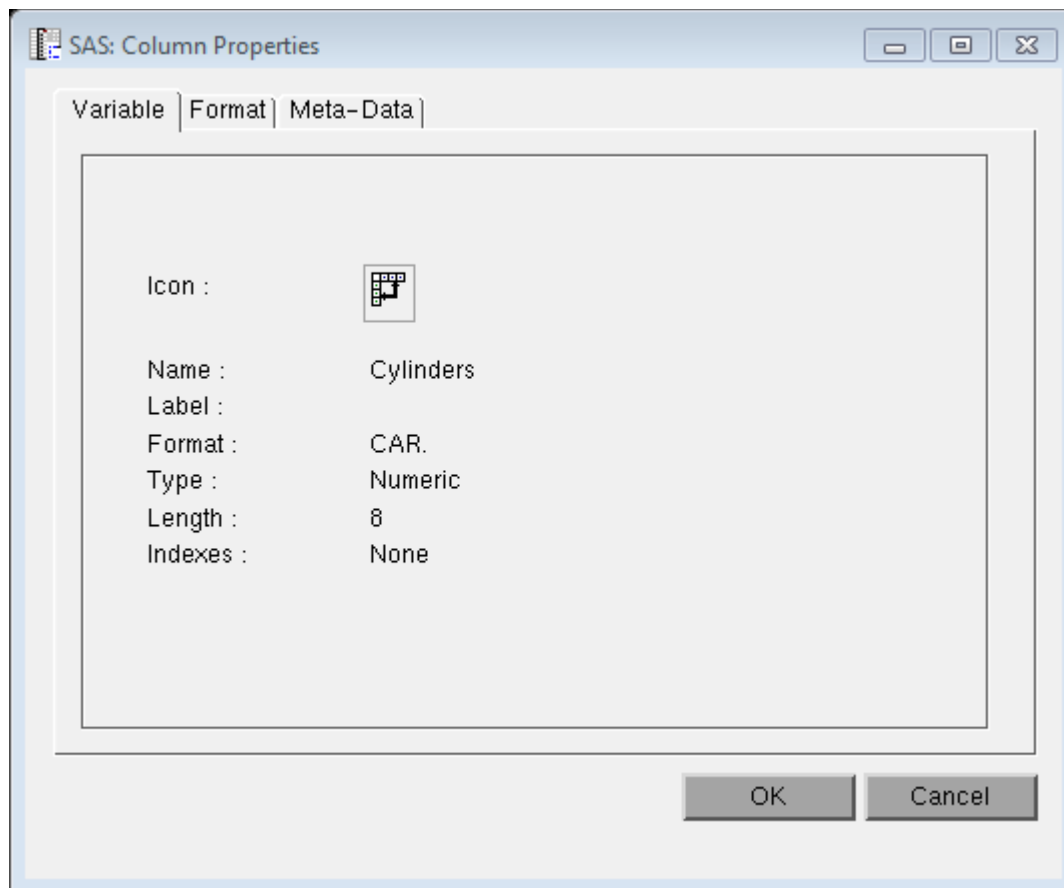
Column's Properties

The Variable Tab

The Format Tab

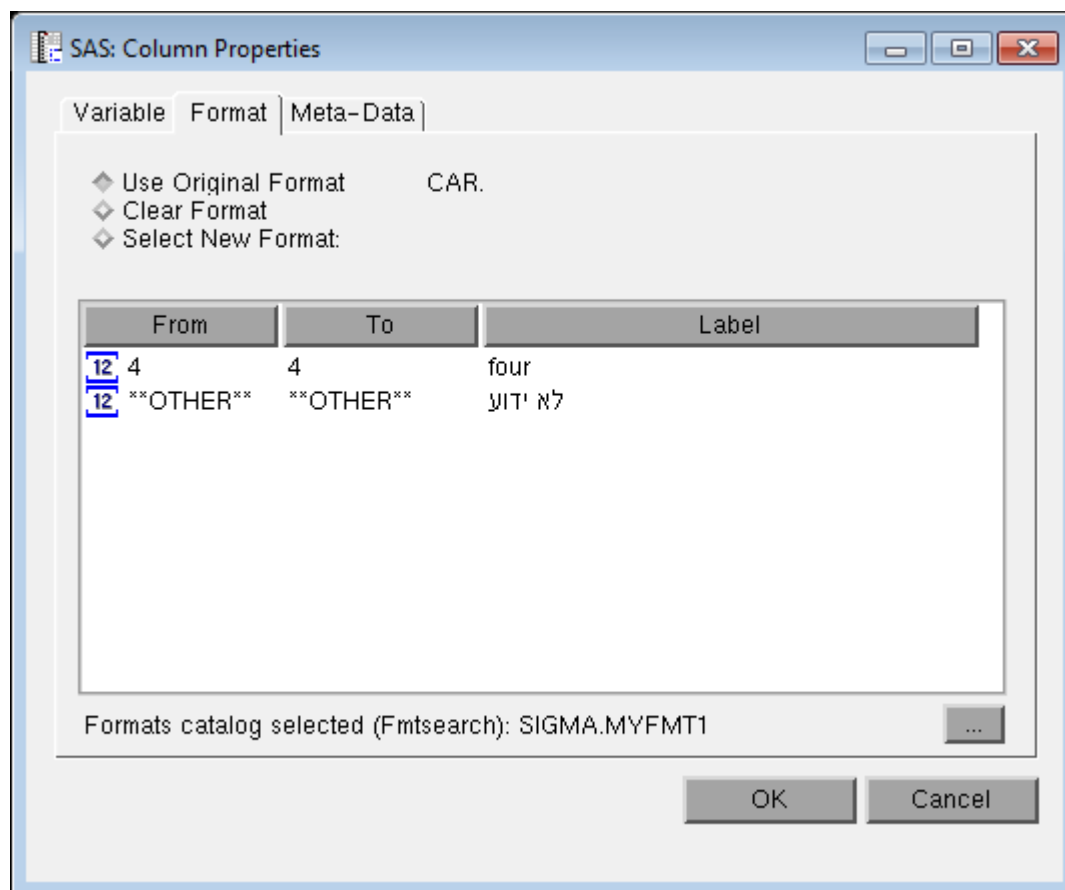
The Meta-Data Tab

The Variable Tab



The variable tab shows administrative information about the variable.

The Format Tab



If the variable has a user-defined format associated with, then the values of the format are displayed in this tab. You can also clear (dis associate) the format from the variable or select a different format to be associated with the variable. This is usually needed if, for example, you need to do a frequency drill down by year for a date variable.

User defined formats are grouped into SAS catalogs. SAS has a specific system option “fmtsearch” that tells SAS where these catalogs are and in what order to search them in order to find the specific format. (This is important if you have several formats with the same name located in several catalogs).

Example of “fmtsearch” option setting:

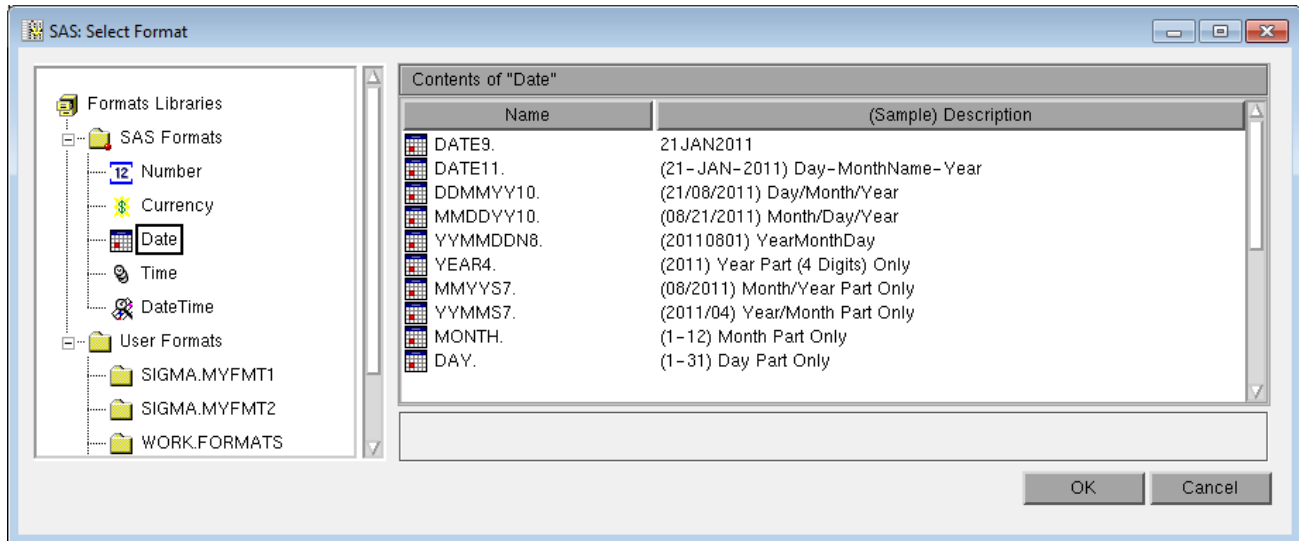
Option

```
Fmtsearch = (work sasuser project1.myfmt project2.fmt library);
```

If you do not specify the catalog name, SAS assume a default name: “formats”. If no specific setting is applied in your SAS session then the default setting for the fmtsearch option is (work library). (“library” libname should be assigned).

In the above window, you can click on the “...” pushbutton to view the current setting of this option in your session.

To select a different format for the column display in %visual viewer, (SAS supplied or User Defined), select the third option, and push the “...” pushbutton. This will display %visual “Select format” window as displayed in the following figure:

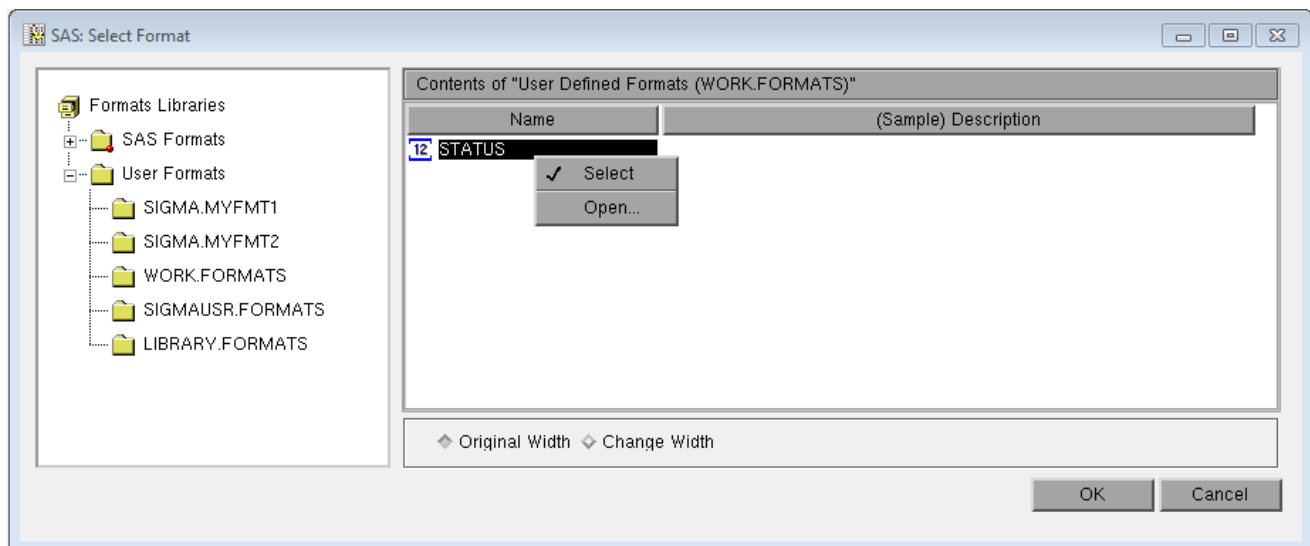


Formats are grouped into two main categories: “SAS Formats” and “User Formats”. Under the “SAS formats” category you will be able to select one format out of many most commonly used SAS supplied format. Some of SAS formats let you control the total width and decimal places for your selection.

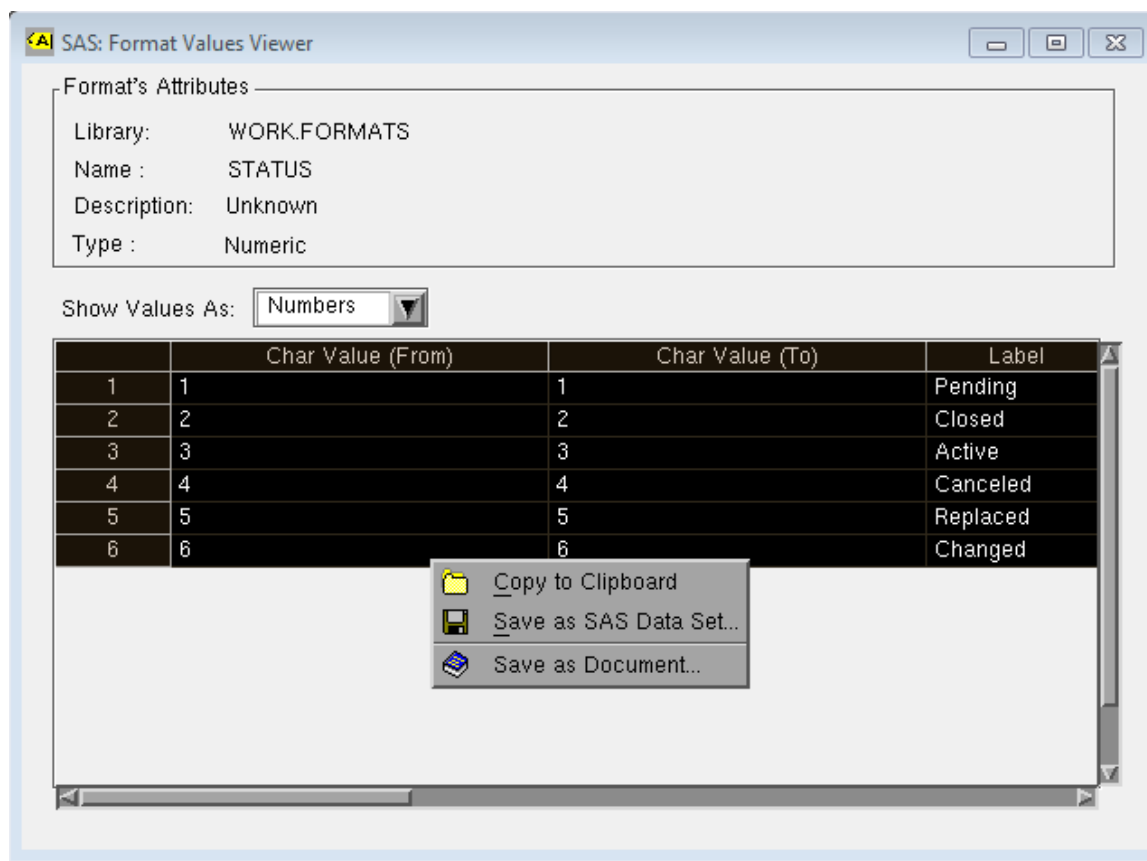
Under the “User Formats” category, you will be able to view each of the catalogs assigned in the “fmtsearch” system option of your SAS session. Select one of the catalogs to view its contents.

Note: SAS formats and user defined formats can be of numeric or character type. The window shows only the type of formats applicable for the type of the selected variable in the %visual viewer.

Before selecting a user defined format you can examine its values by clicking on the right mouse:

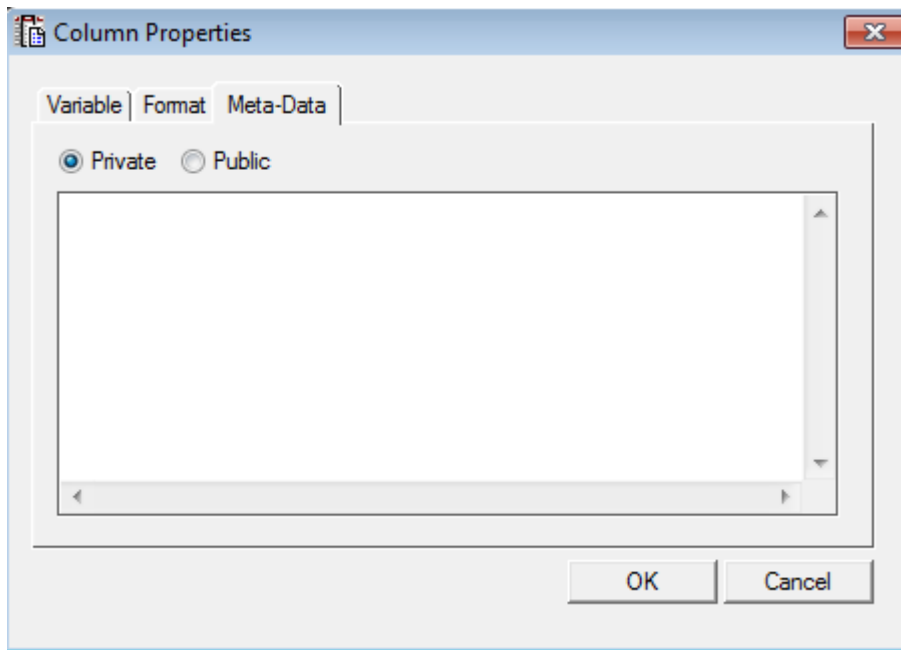


The content of the format is displayed in the following window:



You can copy the format's values to the clipboard, to a new SAS data set or to a report using %visual document management system.

The Meta-Data Tab



The Meta-Data tab shows information stored in BiX Meta-Data server.
(Requires a separate license)

BiX Meta-Data consists of two sections:

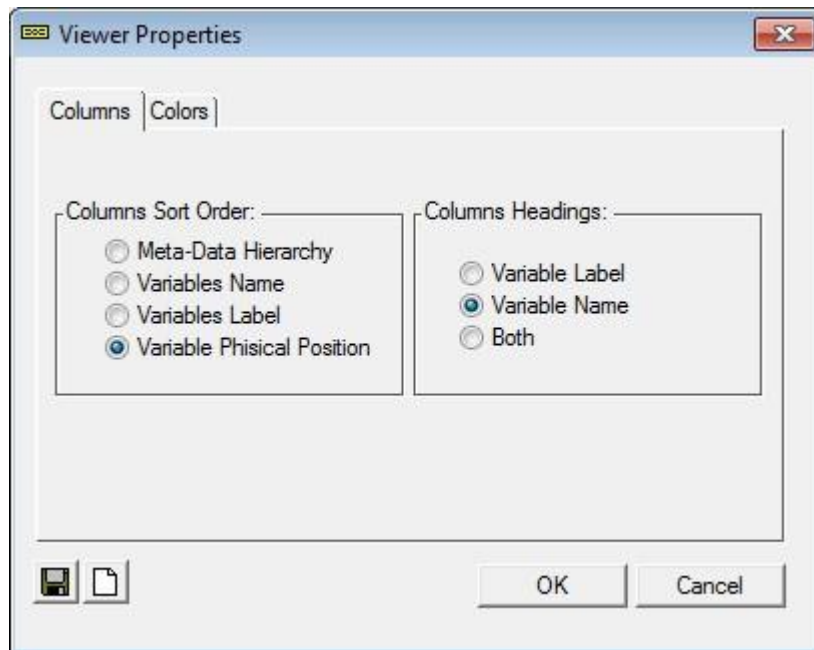
- 1) **Variable hierarchy** – organizes the variables of a data set in a hierarchy that resembles business logic instead of alphabetic order.
For example, variables like “street” “city” can be grouped together under the hierarchy “Home Address” instead of being displayed apart one from the other according to their alphabetic order. The hierarchy of variables can be in viewed in several %visual windows.
- 2) **Business Meta-Data** – data about each variable like the formula used to calculate it, its role in the system and whatever you may think is important to know about the variable. This text is displayed in the above window.

Metadata can be “public” shared by all %visual users on the same server (typically set by %visual administrator) or a “private” metadata set by yourself for your own private use.

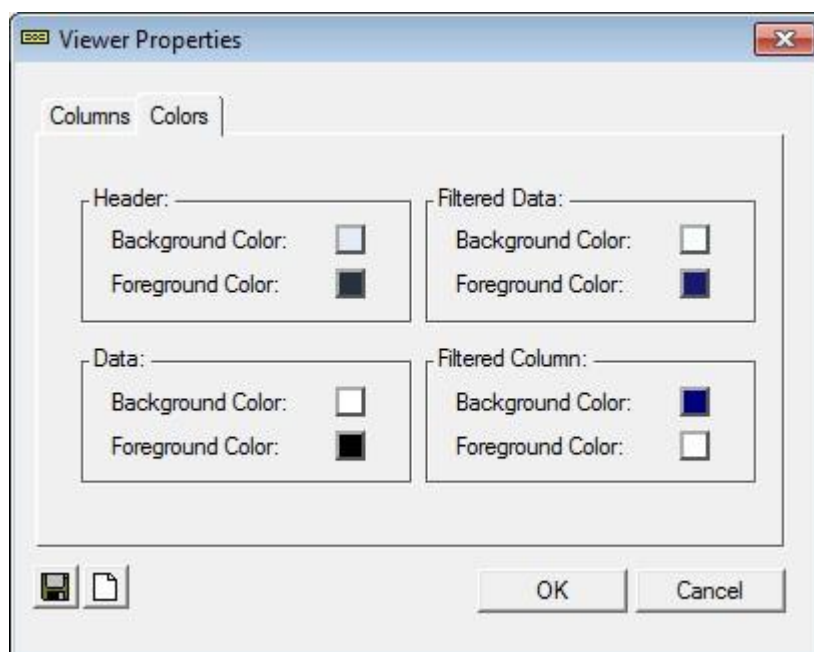
Viewer Properties

The "Viewer Properties" window allows to select your choice of colors and settings for "%Visual Viewer" Window.

The columns tab



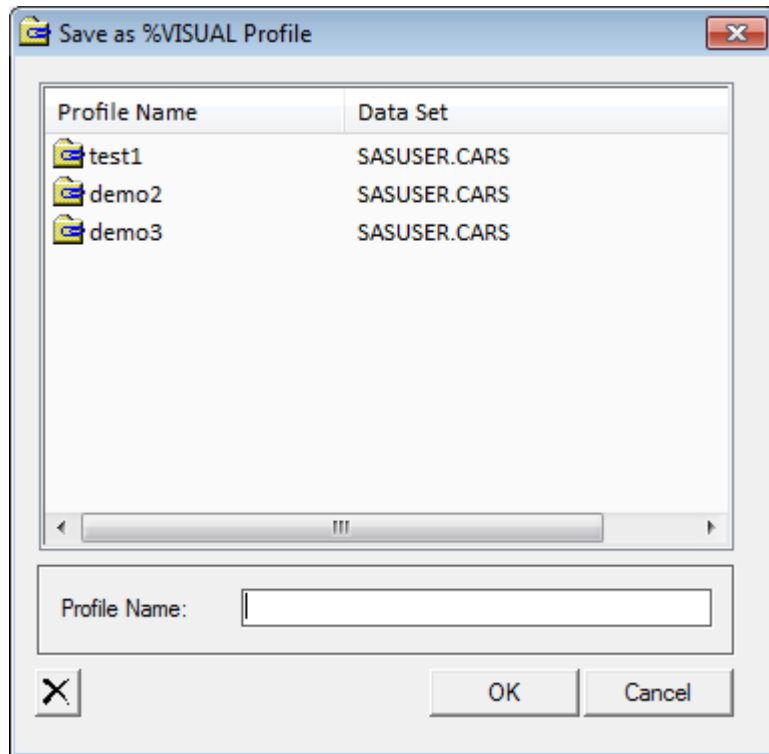
The Colors Tab



You can save your settings to your %Visual profile, thus, each time a "%Visual Viewer" Window will be opened, It will use the settings from your profile.

Save as Profile

Each time you need to save the current settings of “%visual viewer” you can save these settings as a named profile. Next time you invoke %Visual, you can use the profile to place you in the same settings again.



The settings that are being saved include:

- 1) All filters (Simple or Advanced) applied to the data set
- 2) All drill downs (Frequency and/or univariate)
- 3) Selected variables (freeze and/or display)
- 4) All conditional formatting
- 5) All sorting

The profile is saved per user in his own SASUSER libname. Each profile is connected to a specific data set and each data set can have multiple profiles for different purposes.

In order to open a data set using a predefined profile, invoke the %visual macro with no parameter. This will launch the “Select Data Set” window where you can select a profile to be loaded.

Your Turn

Your feedback is important to us. If you have comments or suggestions about BiX %Visual Viewer, we'd like to hear from you.

Send your comments to: support@bixforsas.com

Thank you for using a BiX product